

Revision of the tribe Achriopterini BRADLEY & GALIL, 1977, with the description of a new genus, three new species and a new subspecies from Madagascar

(Phasmatodea: Phasmatidae: Phasmatinae)

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Abstract

The Malagasyan and Comorian tribe Achriopterini BRADLEY & GALIL, 1977 is revised on species level. A new diagnosis of the tribe and keys to distinguish the included genera are provided. A discussion and biogeography show Achriopterini BRADLEY & GALIL, 1977 to be closely related to the Papuan tribe Stephanacridini BRADLEY & GALIL, 1977 and furthermore, to show affinity to the Neotropical genus *Pterinoxylus* AUDINET-SERVILLE, 1838.

The new genus *Glawiana* gen. nov. is established for *G. glawi* sp. nov. from Southern Madagascar, which is designated as the type species. The new genus differs from *Achrioptera* COQUEREL, 1861 by: the smaller size and stouter body; relatively shorter mesothorax; strongly globose and bi-lobed head and presence of prominent lobes on the dorsal carina of the meso- and metatibiae. The type-species *Glawiana glawi* sp. nov. is known from a unique female only.

A complete revision of the genus *Achrioptera* COQUEREL, 1861 (Type-species: *Achrioptera fallax* COQUEREL, 1861) is provided alongside a new diagnosis of the insects and eggs and determinating keys to the species. Redescriptions, measurements, synonymic listings, a literature review and illustrations are provided for all known species and maps show the known records of all taxa. The genus *Hovaspectrum* REHN, 1940 (Type-species: *Hovaspectrum lobipes* REHN, 1940) is found to be a synonym of *Achrioptera* COQUEREL, 1861 (syn. nov.).

Two new species and a new subspecies of *Achrioptera* COQUEREL, 1861 from Madagascar are described: *Achrioptera gracilis* sp. nov. from the female and *Achrioptera magnifica* sp. nov. and *A. punctipes cliquennoisi* ssp. nov. from both sexes and the eggs. *Achrioptera composita* CARL, 1913 and *Achrioptera intermedia* REDTENBACHER, 1908 are synonymized with *Achrioptera punctipes* (AUDINET-SERVILLE, 1838) (syn. nov.).

The eggs of *Achrioptera punctipes* (AUDINET-SERVILLE, 1838) are redescribed and illustrated, those of *A. fallax* COQUEREL, 1861, *Achrioptera magnifica* sp. nov. and *Achrioptera spinosissima* (KIRBY, 1891) are described and illustrated for the first time. The egg of *A. punctipes cliquennoisi* ssp. nov. is shortly characterized. The newly discovered females of *Achrioptera fallax* COQUEREL, 1861 and *Achrioptera impennis* REDTENBACHER, 1908 and the still unknown adult male of *Achrioptera impennis* REDTENBACHER, 1908 (so far only known from a penultimate instar nymph) are described and illustrated for the first time. A lectotype is designated for *Achrioptera pygmaea* REDTENBACHER, 1908.

Introduction

Although the order Phasmatodea includes some of the world's largest and most spectacular insects, even such taxa as the Malagasyan and Comorian genus *Achrioptera* COQUEREL, 1861 have remained poorly studied. The genus *Achrioptera* COQUEREL, 1861 is a member of the tribe Achriopterini BRADLEY & GALIL, 1977 and undoubtedly inherits the most spectacular, striking and beautiful Phasmatodea of the Malagasyan fauna, some of which reach body lengths of up to 25 cm.

The tribe Achriopterini BRADLEY & GALIL, 1977 included two genera, namely *Achrioptera* COQUEREL and the monotypic *Hovaspectrum* REHN, 1940. So far, eight species have been listed in *Achrioptera* all recorded from Madagascar and the Comoro Islands. But, although the number of known taxa is small, identification of species has remained difficult. Research in the literature and direct examination of all necessary type-

material have confirmed the existence of several misidentifications and unrecognized synonymies on generic and species-level. Searching through museum specimens revealed the discovery of two new species of *Achrioptera* COQUEREL in MNHN, a new genus and species in ZSMC as well as the so far unknown sexes of two and eggs of three species. Furthermore, N. CLIQUENNOIS (La Réunion) provided specimens of an unidentified *Achrioptera* which have proven to represent a new subspecies of *A. punctipes* (AUDINET-SERVILLE, 1838).

The present work represents a complete taxonomic revision of the tribe Achriopterini BRADLEY & GALIL, 1977 with notes on its systematic position in the classification of Phasmatodea, systematization and biogeography. It provides a new diagnosis of the tribe Achriopterini, a new diagnosis of the genus *Achrioptera* COQUEREL, the description of a new genus and three new species from Madagascar, a redescription and illustration of all described species, the discussion of their systematic position and differentiation, complete synonymic and literary listings and clarification of misidentifications, determination keys to species and maps which show the known geographic distribution of the different taxa.

Material and methods

Whenever possible, this work has been based on examination of the necessary type material, which has received a lot of support from the curators of all museums containing type or non-type material of the tribe *Achriopterini* BRADLEY & GALIL. Additionally, material from private collections has been examined. All specimens used for this study were dried and needled. Examined eggs were fully developed and either already laid or taken from the ovipositor of preserved females. The type specimens of the new taxa are deposited in MNHN, NHMW and ZSMC.

Type material is listed in the synonymic chapter of each species. Further examined non-type material is listed separately. The data of examined specimens is reproduced as on the original labels, which means these may include misspellings e.g. Makjakendziana instead of Manjakandriana. Corrected spellings are provided in the section "distribution" which is included for each species. Some records were impossible to locate and remain uncertain (e.g. "Est Anobasari" or "Rahohna").

Examinations of insects and eggs were carried out using a Russian MBC-10 stereoscope and an entomological magnifying glass with 4x magnification. Eggs were examined at 10x magnification. Measurements are given to 0.1 mm and were taken using a long ruler and a digital caliper. Measurements of type specimens are listed separately. If not differently cited, the colouration of insects is described from dried specimens. In these cases attention needs to be drawn as specimens may have changed colour after preservation.

The terminology used for the description of egg structures follows that of CLARK-SELICK (1997).

Abbreviations used

ANSP:	Academy of Natural Sciences, Philadelphia/U.S.A.
BMNH:	British Museum of Natural History, London/England.
IRSM:	Institute Royal Scientifique, Moneli/Comoros.
MHNG:	Museum d'Histoire Naturelle, Geneva/Switzerland.
MNHN:	Museum National d'Histoire Naturelle de Paris/France.
NHMB:	Naturhistorisches Museum, Basel/Switzerland.
NHMW:	Naturhistorisches Museum, Vienna/Austria.
OXUM:	Hope Entomological Collections, University Museum, Oxford/England.
ZMHB:	Zoologisches Museum der Humboldt-Universität, Berlin/Germany.
ZSMC:	Zoologische Staatssammlung München, Munich/Germany.
FH:	Private collection of Frank H. HENNEMANN, Freinsheim/Germany.
OC:	Private collection of Oskar V. CONLE, Bolsterlang/Germany.
HT:	Holotype
PT:	Paratype
ST:	Syntype
LT:	Lectotype
PLT:	Paralectotype

Genus eponym: *Achrioptera* COQUEREL, 1861: 495.

Achriopterini BRADLEY & GALIL, 1977: 194.

GÜNTHER, 1953: 555.

OTTE & BROCK, 2003: 329.

Acrophyllini REDTENBACHER, 1908: 436 ff. (in part)

Diagnosis: ♀♀, ♂♂: Medium sized to very large (body length 8.2-25.8 cm), anareolate Phasmatodea; often very colourful and multicolourous. Body elongate, cylindrical. Abdomen longer than thorax and head combined. Ocelli absent. Antennae, with 17-30 segments, not projecting over posterior margin of mesonotum (♀♀) or metanotum (♂♂); scapus simple; segment IV distinctly shortened, transverse. Mesothorax elongate, longer than head and pronotum combined. Meso- and metathorax granulose, tuberculate or spinose. Tegmina short, just covering bases of alae or rudimentary. Alae fully developed and reaching as far back as to tergite IV, or rudimentary. Anal region brown to black with a variable number of transparent markings; occasionally combined with another colour (green, orange, red or pink) especially in anal areas 1-2. Median segment longer than metanotum. Abdominal tergites II-VII longer than wide, parallel-sided. Sternite VII of ♀♀ with a praepercular organ. Epiproct very small; roughly triangular. Cerci very short; cylindrical or oval in cross-section. Vomer of ♂♂ sclerotized and easily visible from externally; triangular. Poculum of ♂♂ strongly convex; cup-like. Subgenital plate of ♀♀ projecting over tergite X; sometimes extremely elongated. Legs rather short; usually armed with various spines and/or lobes. Profemora basally curved and compressed; clearly triangular in cross-section. Postero-dorsal carina strongly reduced, antero-dorsal carina raised, medio-ventral carina lacking. All carinae of protibiae elevated. Meso- and metafemora trapezoidal in cross-section; dorsal carinae strongly neared. Meso- and metatibiae triangular in cross-section; dorsal carinae completely fused with another. No median carina on ventral surfaces of meso- and metafemora; at best a row of indistinct granules. Basitarsus longer than second tarsomere. [♂♂ of *Glawiana* **gen. nov.** are not known]

Diagnosis of the eggs: Medium to large. Capsule distinctly longer than wide, more or less laterally compressed. Exterior margin of operculum and polar-area with prominent hollow, crown or rim-like extensions. External micropylar plate longer than wide, covering less than 1/3 of capsule length; closed internally.

[Eggs of *Glawiana* **gen. nov.** are not known]

Comments: REDTENBACHER (1908) included *Achrioptera* COQUEREL, 1861 in his tribe Acrophyllini of the subdivision Anareolatae. GÜNTHER (1953: 555) originally established Achriopterini as a tribe of the subfamily Phasminae KARNY, 1923 and included *Achrioptera* COQUEREL as the only known genus. GÜNTHER distinguished Achriopterini from the other tribes of Phasminae by: "Operculum der ♀♀ weit über das Abdominalende hinaus verlängert. Keine untere Mittelleiste an den Vorderschenkeln. Madagaskar." [Operculum of ♀♀ considerably projecting over apex of abdomen. No medio-ventral carina of profemora. Madagascar]. BRADLEY & GALIL (1977: 192) renamed GÜNTHER's Phasminae into Phasmatinae, took over GÜNTHER's tribe Achriopterini and characterized it by "Operculum of female extended broadly over apex of abdomen" and "Body elongate, spinose; elytra elongate-oval". Furthermore, BRADLEY & GALIL included the monotypic Malagasyan genus *Hovaspectrum* REHN, 1940 which is a junior synonym of *Achrioptera* COQUEREL, 1861 (**syn. nov.**).

Studies in the subfamily Phasmatinae have shown Achriopterini to find its closest relative in the Papuan tribe Stephanacridini BRADLEY & GALIL, 1977 (= Stephanacridini GÜNTHER, 1953) which is not only seen in a strikingly similar general appearance, but also in numerous features of the insects and eggs (for argumentation see discussion and biogeography).

Distribution: Madagascar & Republic of Comoros.

Genera included:

1. *Achrioptera* COQUEREL, 1861
= *Enetia* KIRBY, 1891: 151.
= *Hovaspectrum* REHN, 1940: 1. **syn. nov.**
2. *Glawiana* **gen. nov.**

Key to ♀♀ of the genera of *Achriopterini* BRADLEY & GALIL

1. Large to very large insects (body length >14 cm); head at least 1.5× longer than wide, vertex flat or very slightly rounded; dorsal carina of meso- and metatibiae not lobed; ventral carinae of mid and hind legs serrate or spinose *Achrioptera* COQUEREL
- Smaller insects (body length 8.2 cm); head globose, indistinctly longer than wide; vertex strongly convex and bi-lobed; dorsal carina of meso- and metatibiae with distinct lobes; ventral carinae of mid- and hind legs not serrate or spinose *Glauwiana* gen. nov.

Genus *Achrioptera* COQUEREL, 1861

Type-species: *Achrioptera fallax* COQUEREL, 1861: 495, pl. 9: 1 (♂), by original designation.

Achrioptera COQUEREL, 1861: 495, pl. 9: 1 (♂).

KIRBY, 1904: 394.

REDTENBACHER, 1908: 439, pl. 20: 5 (♂ and ♀)

CARL, 1913: 42.

GÜNTHER, 1953: 555.

PAULIAN, 1960: 272, fig. 1.

BRADLEY & GALIL, 1977: 194.

HENNEMANN, 1994: 6, figs. 1-7 (description, rearing, biology, defensive behaviour)

CLARK-SELICK, 1997: 111, fig. 80 (egg) & 119.

CLARK-SELICK, 1998: 226.

BRAGG, 2001: 628.

ZOMPRO & BROCK, 2003: 9.

OTTE & BROCK, 2003: 329.

Acroioptera, KIRBY, 1891: 150 (misspelling of *Achrioptera* COQUEREL)

Cyphocrana?, AUDINET-SERVILLE, 1838: 239 (in part)

Cyphocrania?, WESTWOOD, 1859: 282.

Enetia KIRBY, 1891: 151 (Type-species: *Enetia spinosissima* KIRBY, 1891: 151, by monotypy) [synonymized by REDTENBACHER, 1908:439]

KIRBY, 1904: 394.

OTTE & BROCK, 2003: 329.

Hovaspectrum REHN, 1940: 1 (Type-species: *Hovaspectrum lobipes* REHN, 1940: 3, by original designation of REHN, 1940: 2) **syn. nov.**

BRADLEY & GALIL, 1977: 194.

BRAGG, 2001: 634.

CLIQUENNOIS, 2003b: 5.

OTTE & BROCK, 2003: 329.

Diagnosis: ♀♀, ♂♂: Medium sized to very large *Achriopterini*. Greyish to brownish or very colourful and multicolourous insects, especially ♂♂. Head at least 1.5× longer than wide, ± cylindrical, vertex flat or very slightly rounded; smooth or armed with a variable number of distinct spines. Pronotum and prosternum smooth or spinose. Mesothorax elongate, at least 1.5× the combined length of head and pronotum. Surface smooth, or more or less densely covered with granules or pointed spines of various sizes. Metasternum smooth, granulose or spinose. If alae developed, usually with very specific and occasionally multicolourous patterns. Tergites II-VII at least 2× longer than wide; smooth. Sternites II-VII smooth or spinose. Praeopercular organ of ♀♀ formed by one or two posteromedial tubercles. Tergite X with a median carina (♀♀) or tectiform (♂♂); in both sexes with a minute posteromedial notch. Epiproct very small, indistinct. Cerci not projecting over tergite X, cylindrical or oval in cross-section. Vomer of ♂♂ with apex bi-dentate. ♂♂ poculum with a ± prominent, rounded, laterally compressed and backward pointing lobe at the angle. Subgenital plate of ♀♀ very elongate and projecting over the tergite X by at least the combined length of tergites IX-X; lancet-, tube- or spatula-like. Apex either pointed, truncate, broadened or notched. Postero-ventral carina of profemora distinctly serrate or spinose. Mesofemora and tibiae strongly laterally compressed. Dorsal carina of meso- and metatibiae smooth, lacking distinct lobes or teeth. All ventral carinae of mid- and hind legs serrate or spinose.

Diagnosis of the eggs: Large (overall length >5.0 mm), capsule longer than high, ± laterally compressed, oval in cross-section. Capsule surface distinctly punctured or rugulose. Dorsally with a ± prominent rib

leading from the anterior end to the micropylar plate. Exterior margin of operculum and polar-area with prominent hollow, crown or rim-like extensions. External micropylar plate longer than wide, slightly lenticular, covering less than 1/3 of capsule length, placed near to polar end of capsule. Internal micropylar plate closed.

Differentiation: ♀♀ differ from *Glawiana* **gen. nov.** by: the larger and more elongate body; elongate ± cylindrical head, which is at least 1.5× longer than wide; relatively longer, lancett-, tube- or spatula-like subgenital plate; spinose postero-ventral carina of profemora; distinctly spinose or serrate ventral carinae of the mid- and hind legs and lack of distinct lobes on the dorsal carina of the meso- and metatibiae.

Comments: COQUEREL's (1861: 495) original description of *Achrioptera* is brief but provides a nice illustration of the ♂ (pl. 9: 1) of his new species *Achrioptera fallax*, which is the type-species by monotypy. When establishing *Achrioptera*, COQUEREL was not aware that another already described species, *Cyphocrana ? punctipes* AUDINET-SERVILLE in 1838, belonged to his new genus as well. Nor was KIRBY (1891: 151) when he established the genus *Enetia* for his new species *Enetia spinosissima*. KIRBY (1891: 150) mentioned *Achrioptera fallax* COQUEREL, 1861 as being the first species of Phasmatodea to have been described from Madagascar but did not recognize the congenerity of *Enetia* and *Achrioptera* COQUEREL. Subsequently, KIRBY (1904: 394) transferred *Cyphocrana ? punctipes* AUDINET-SERVILLE to *Achrioptera* COQUEREL but still listed *Enetia* KIRBY, 1891 as a valid genus. REDTENBACHER (1908: 439) synonymized *Enetia* KIRBY with *Achrioptera* COQUEREL and provided a detailed diagnosis of the genus along with keys to the species.

REHN (1940: 1) established *Hovaspectrum*, as being closely related to *Achrioptera* COQUEREL. REHN distinguished *Hovaspectrum* from *Achrioptera* COQUEREL (only ♂♂) by: (1) the dilations and serrations of the postero-dorsal and postero-ventral carinae of the profemora occupying less than half the length of femora and being serrato-lobate instead of spinose; (2) the thorax being at most sparsely tuberculate but not spinose; (3) simple meso- and metapleurae; (4) lack of spines on coxae, and (5) proportionally shorter legs. All of REHN's distinguishing characters do however lie within the range of *Achrioptera* COQUEREL and are thus not of generic value at all. Instead, *Hovaspectrum* REHN shows most of the typical characters of *Achrioptera* COQUEREL, and represents a quite typical ♂ of that genus. Consequently, *Hovaspectrum* REHN, 1940 is to be considered as a junior synonym of *Achrioptera* COQUEREL (**syn. nov.**).

Distribution: Madagascar & Republic of Comoros (endemic).

Species and subspecies included:

1. *Achrioptera fallax* COQUEREL, 1861: 495, pl. 9: 1.
2. *Achrioptera gracilis* **sp. nov.**
3. *Achrioptera griveaudi* PAULIAN, 1960: 272, fig. 1.
4. *Achrioptera impennis* REDTENBACHER, 1908: 441.
5. *Hovaspectrum lobipes* REHN, 1940: 3, figs. 1-2.
6. *Achrioptera magnifica* **sp. nov.**
7. *Cyphocrana ? punctipes* AUDINET-SERVILLE, 1838: 239.
= *Achrioptera composita* CARL, 1913: 42. **syn. nov.**
= *Achrioptera intermedia* REDTENBACHER, 1908: 440. **syn. nov.**
8. *Achrioptera punctipes cliquennoisi* **ssp. nov.**
9. *Achrioptera pygmaea* REDTENBACHER, 1908: 440.
10. *Enetia spinosissima* KIRBY, 1891: 151.

Keys to the species of *Achrioptera* COQUEREL

♂♂

[The ♂♂ of *A. gracilis* **sp. nov.** and *A. griveaudi* PAULIAN, 1960 are not known.]

1. Median segment distinctly longer than metanotum; alae developed 2
– Median segment slightly shorter than metanotum; alae rudimentary, hardly visible
..... *impennis* REDTENBACHER
2. Metasternum smooth or tuberculate; small insects (<96.0 mm) 3
– Metasternum armed with ± distinct spines; larger insects (>111.0 mm) 4

3. Mesonotum with distinct red spines; alae reaching to posterior margin of median segment (11.0-12.0 mm); carinae of profemora not dilated *pygmaea* REDTENBACHER
- Mesonotum with minute green spines; alae reaching to anterior margin of tergite IV (28.0 mm); profemora with all carinae apically dilated and serrato-lobate *lobipes* (REHN)
4. Pronotum, prosternum and sternites IV-VI unarmed 5
- Pronotum, prosternum and sternites II-VI spinose *spinosissima* (KIRBY)
5. Alae reduced (15.0-20.0 mm), not projecting over posterior margin of median segment; body and legs bluish green, ventral surfaces of femora orange *fallax* COQUEREL
- Alae long (> 33.0 mm), projecting over posterior margin of tergite III; colouration different 6
6. Large (body length 129.0-149.0 mm), very colourful species (green, yellow, red and white); spines of mesothorax bright green 7
- Smaller (body length 111.0-112.5 mm), yellowish or greenish brown species; spines of mesothorax black; antennae pale reddish brown *magnifica* sp. nov.
7. Robust insect; abdomen yellow; tegmina and costal region of alae dark green; anal region of alae greyish black with whitish or slightly bluish transparent spots *punctipes* (AUDINET-SERVILLE)
- More slender insects; abdomen green with yellow transverse bands on posterior margin of each tergite; tegmina and costal region of alae brown; anal region of alae dark brown with bright orange, transparent spots *punctipes cliquemmoisi* ssp. nov.

♀♀

[The ♀♀ of *A. pygmaea* REDTENBACHER, 1908 and *A. lobipes* (REHN, 1940) are not known.]

1. Prosternum unarmed 3
- Prosternum spinose 2
2. Very large species (body length 221.8-238.0 mm); pronotum and sternites II-VII spinose; alae fully developed (54.0-55.0 mm), reaching half way along tergite III *spinosissima* (KIRBY)
- Smaller species (body length 184.5-200.0 mm); pronotum and sternites IV-VII unarmed; alae reduced (24.1-26.0 mm), not projecting over posterior margin of median segment *fallax* COQUEREL
3. Median segment distinctly longer than metanotum; tegmina and alae developed (>21.0 mm); metasternum granulose or spinose 4
- Median segment indistinctly longer than metanotum; tegmina and alae rudimentary (2.3-3.2 mm); metasternum smooth *impennis* REDTENBACHER
4. Subgenital plate tube-like, apex with a medial notch; back of head slightly convex; alae not projecting over median segment (21.0 mm), anal region with pink spots *gracilis* sp. nov.
- Subgenital plate flattened, scoop- or spatula-like, apex not notched; head cylindrical, vertex flat; alae at least covering tergite II (>31.0 mm); colouration of anal region different 5
5. Apex of subgenital plate truncate and/or broadened; antennae <30.5 mm; Madagascar 6
- Subgenital plate tapered, apex pointed; antennae >38.0 mm; Comoros *griveaudi* PAULIAN
6. Large species (body length 184.5-223.7 mm); mesothorax and metasternum set with prominent, bright green spines; operculum apically broadened 7
- Smaller species (body length 156.5-176.0 mm); mesonotum, -sternum and metasternum with tubercles or indistinct dark greyish green spines; subgenital plate parallel-sided; antennae pale reddish to yellowish brown *magnifica* sp. nov.
7. Mesonotum 1.6× longer than head and pronotum combined; antennae dark red; anal region of alae greyish black with whitish or slightly bluish transparent spots *punctipes* (AUDINET-SERVILLE)
- Mesonotum 1.8× longer than head and pronotum combined; antennae greyish green with apices dark red; anal region of alae dark brown with bright orange, transparent spots *punctipes cliquemmoisi* ssp. nov.

Achrioptera fallax COQUEREL, 1861
(Figs. 1, 2, 23-25, 36-39, 60-63, 74-75, 86)

Achrioptera fallax COQUEREL, 1861: 495, pl. 9: 1. HT, ♂: Madagascar, Port Leven (MNHN – not traced)
KIRBY, 1904: 394.
REDTENBACHER, 1908: 440.
CLIQUENNOIS, 2003b: 5 (HT not traced)
OTTE & BROCK, 2003: 330 (HT not traced)

Acroioptera fallax, KIRBY, 1891: 150 (misspelling of *Achrioptera* COQUEREL)

Material examined [7 ♂♂, 5 ♀♀, eggs]: 1♂: Madagascar, Diégo Surazé, 1899, coll. Pantel, *Achrioptera fallax* Coq. 1♂: Museum Paris, Diégo Suarez, L. Chopard & L. Berland det.; 2♂♂, 1♀: Museum Paris, Madagascar, Coll. Bertrand-Loubet, 1918; 1♂: Tsivory, Madagascar, *Achrioptera fallax* Coq. ♂; 1♂: Museum Paris, Madagascar, Coll. L. Chopard 1914, Toirory, Madagascar; 1♀, 1 egg: Muséum Paris, Orangaa, baie de D. Suarez, J. Phinot; 1♀: Museum Paris, Diégo-Surazé; 1♀: Museum Paris, Madagascar, Prov. d'Orangéa, Maurice de Rothschild, 1905, *Achrioptera intermedia* Redt. ♀, L. Chopard & L. Berland det. (MNHN), 1♂: Madagascar, Coll. Br. v. W., (NHMW); 1♀, 14 eggs: Nord Madagascar, Montagne des Français, Basis ca. 100 m, 12°20'02"S, 49°21'31"E, leg. F. Glaw II.2004 (ZSMC).

Systematic position and differentiation: Easily distinguished from all other members of the genus by the following combination of characters: ♀♀: “alae not projecting over posterior margin of median segment/prosternum and sternites II-III spinose/head multispinose” and ♂♂: “alae not projecting over posterior margin of median segment/body plain bluish green/ventral surfaces of femora orange”.

Closely related to *A. spinosissima* (KIRBY) but distinguished by: the smaller size; smooth pronotum; shorter alae which do not project over the median segment and have the anal region with a broad, transverse bright orange or red marginal band; lack of spines on sternites IV-VII and enlarged apical tooth of the dorsal carinae of the meso- and metafemora of both sexes; reddish brown (♀♀) or yellow (♂♂) antennae and smaller number of spines on the mesothorax of ♂♂.

Description:

♀: Large (body length 184.5-200.0 mm, including subgenital plate 188.0-210.6 mm), moderately slender (maximum body width 9.6 mm) species with a densely spinose meso- and metathorax, long antennae (42.0 mm) and short alae (24.1-26.0 mm).

Colouration: General colouration of body and legs reddish or greyish mid to dark brown with a dense network of numerous white speckles on thorax and irregular whitish markings and longitudinal lines on abdomen. Legs with numerous minute white spots (more sparingly on hind legs). Ventral surfaces of femora pale orange. Knees greenish; interior surfaces of profemora bluish grey basally. Complete spination of head, thorax and legs orange to red with black points. Head with two longitudinal white lateral lines and a white median line. Occasionally with another very short line directly behind eyes. Antennae dark red in basal half and becoming brown towards apices. Pronotum plain pale greyish with four indistinct whitish longitudinal lines. Tegmina plain mid brown with slightly lighter veining. Costal region of alae plain mid brown in apical half, basal half blackish. Anal region greyish black with numerous small transparent patches arranged in irregular transverse bands and becoming smaller and more sparingly towards the exterior margin. The latter with a bold transverse, orange to red marginal band.

Head: Elongate, 1.5× longer than wide, cylindrical, very slightly narrowing towards posterior margin. Vertex flat and multispinose: four prominent spines forming a quadrate and a further prominent spine laterally, which is perfectly set on the first lateral line. Eyes creamish brown, anterior margin slightly truncate, convex. Antennae at least reaching $\frac{3}{4}$ the way along mesonotum, with 28 segments. Scapus almost quadrate, pedicellus slightly longer than broad, oval in cross-section and shorter than scapus. Third antennomere as long as scapus and pedicellus combined, IV transverse, V slightly shorter than III, remaining increasing in length.

Thorax: Pronotum slightly longer and broader than head, slightly medially constricted, 1.5× longer than wide. Anterolaterally with an indistinct bold dark marking. Median transverse depression slightly curved, reaching lateral margins of segment. Prosternum with a pair of medium-sized spines. Mesothorax elongate, slightly longer than 2× combined length of head and pronotum, and all over and densely set with numerous long pointed spines. Mesonotum parallel-sided. Metanotum quadrate, metapleurae and sternum densely covered with long pointed spines. Spines of meso- and metapleurae arranged in two

longitudinal lines. Tegmina oval, narrowing towards base and with an indistinct central hump, projecting over posterior margin of metanotum. Alae not reaching posterior margin of tergite II.

Abdomen: Median segment almost 3× longer than metanotum, 2.5× longer than wide, slightly medially constricted, smooth. Segments II-VI cylindrical, parallel-sided, all of equal width and slightly increasing in length, II less than 1.5×, VI 2× longer than wide. Sternites II-III each with a pair of medium sized spines near posterior margin; occasionally with 1-2 further medial spines. Tergite VII distinctly narrower and slightly shorter than VI, parallel-sided, 2.5× longer than wide. Praeopercular organ formed by a pair of blunt posteromedial spines on sternite VII. Tergite VIII half the length of VII, strongly convex, mediolaterally depressed, slightly longer than wide. IX half the length of VIII, slightly transverse. Tergite X with a clear median keel in posterior half, almost as long as VIII, slightly narrowing towards apex, posterior margin slightly truncate. Epiproct small, rounded and keeled. Cerci not reaching posterior margin of tergite X, laterally compressed and tapered towards apices. Subgenital plate keeled but becoming more flattened towards pointed apex, projecting over tergite X by almost the length of the three terminal tergites combined (projecting part 10.6-15.5 mm).

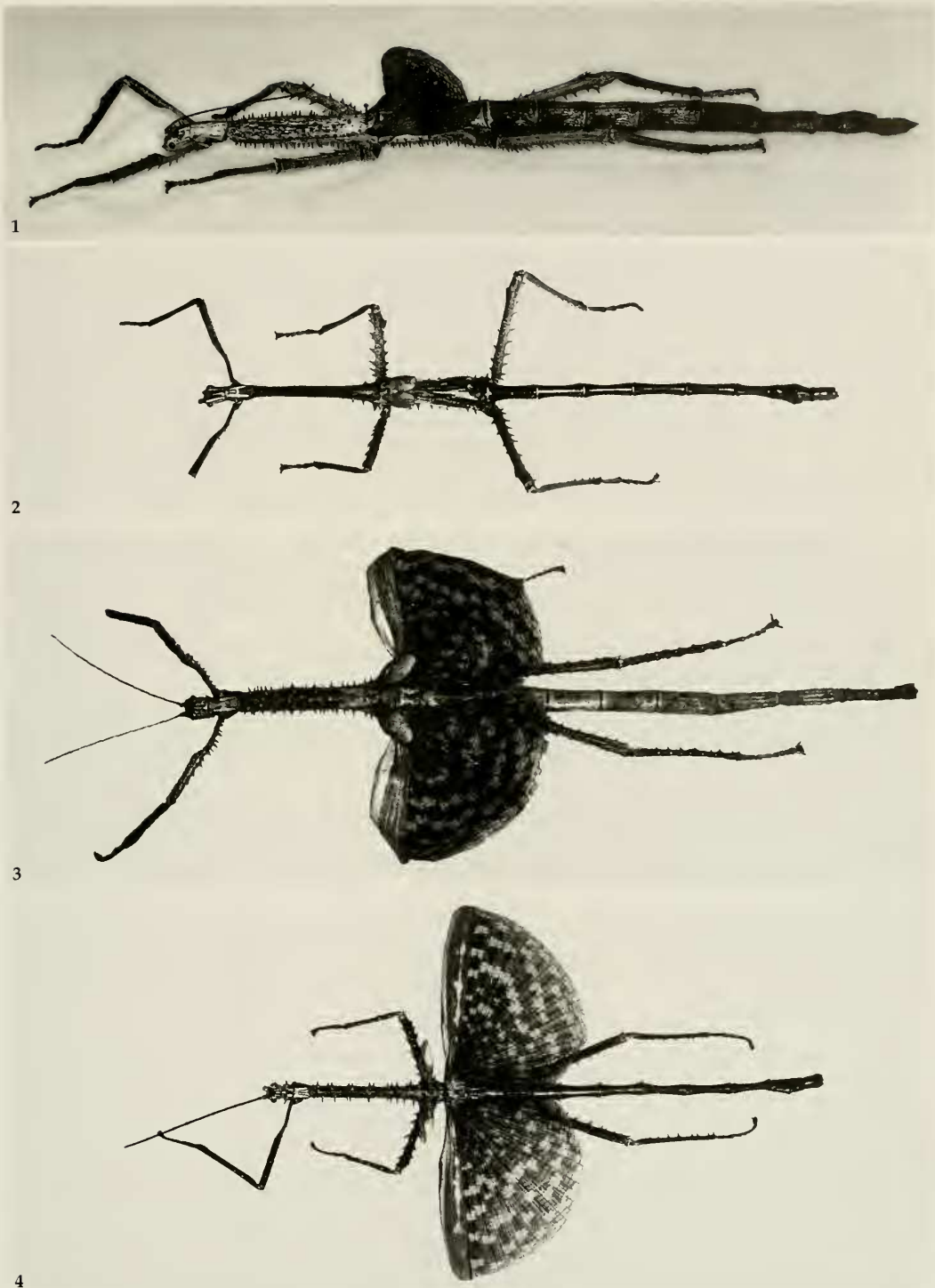
Legs: All of moderate length, mid legs reaching posterior margin of tergite II, hind legs projecting over posterior margin of tergite VI. Antero-dorsal carina of profemora strongly raised and with 4-6 rough, truncate serrations, postero-ventral carina with 9-11 long, slender and pointed spines. All carinae of protibiae dilated but tending to become more slender towards apex of tibia, antero-dorsal carina irregularly wave-like. Probasitarsus as long as following two tarsomeres combined. Mesofemora slightly laterally compressed, ventral carinae with 7-8 prominent, pointed teeth, postero-dorsal carina with 4-5 pointed, triangular teeth and another quite lobe-like tooth apically. Antero-dorsal carina only with a single minute tooth near base and an enlarged, triangular tooth near apex. Ventral carinae of mesotibiae with 6-9 elongate, straight spines in apical half, increasing in length towards apex of tibia. Ventral carinae of metafemora armed with 9-11 prominent, pointed spines, antero-dorsal carina with 2 and postero-dorsal carina with 4 medium-sized teeth in basal half. Apically each carina with an enlarged, slightly lobe-like tooth, that of the postero-dorsal carina distinctly larger. Ventral carinae of metatibiae with 6-7 elongate, straight spines in apical half, increasing in length towards apex of tibia. Meso- and metabasitarsus slightly longer than following two tarsomeres combined, ventral carinae usually with a minute tooth.

♂: Medium-sized (body length 123.0-155.0 mm), moderately slender (maximum body width 5.0 mm) with long antennae (45.0-55.0 mm) reaching to posterior margin of mesonotum and short alae (15.0-20.0 mm). Body surface glabrous.

Colouration: General colour of body and legs bluish green; ventral surfaces, carinae and spination of femora bright orange. Tibiae and dorsal armature of femora bluish green. All femora irregularly set with minute white spots. Head with a white median line in posterior half, and two lateral lines of which the inner is much more prominent and starts from above the eyes running along the complete length of the head capsule; the outer less distinct. Occasionally there is another very short line directly behind the eye. Antennae yellowish, scapus and pedicellus green. Pronotum with a bold, longitudinal white stripe along lateral margins, which are connected by a very faint white transverse line over the median transverse depression, forming a "H"-like marking. Median segment with irregular whitish markings just behind the middle. Tegmina yellow with a bold, oval reddish brown apical marking. Anterior margin with a white longitudinal stripe which soon becomes fainter and disappears about $\frac{2}{3}$ the way along tegmina. Costal region of alae broad, reddish brown, anterior margin with a broad yellow longitudinal band. There is another more indistinct longitudinal, white stripe which begins at the base of alae and soon disappears. Anal region generally as in ♀♀ but colouring more intense and marginal band relatively broader.

Head: As in ♀♀. Vertex mostly smooth but occasionally with one or two minor spines. Eyes strongly convex and prominently projecting from head capsule. Antennae as in ♀♀, however reaching to posterior margin of mesonotum.

Thorax: Pronotum as in ♀♀, prosternum smooth. Mesothorax very elongate and slender, almost 3× longer than head and pronotum combined and slightly broadened at posterior margin. Mesonotum with a faint pale green median line, completely smooth or with up to 16 minute, pointed spines. Mesopleurae with 3-4 prominent, slightly backcurving spines in posterior quarter. Mesosternum irregularly set with numerous pointed spines, increasing in length towards posterior margin of segment. Metanotum indistinctly longer than wide. Metapleurae with a row of 7-11 large, slightly backcurving spines, metasternum densely set with 5-7 pairs and often a further single prominent, orange tipped spines, and three slightly smaller, orange spines on metacoxae. Tegmina oval, slightly convex and narrowing towards base, slightly



Figs. 1-4. 1, *Achrioptera fallax* COQUEREL: ♀ (MNHN). 2, *Achrioptera fallax* COQUEREL: ♂ (MNHN). 3, *Achrioptera spinosissima* (KIRBY): ♀, HT (BMNH). 4, *Achrioptera spinosissima* (KIRBY): ♂ (MNHN).

projecting over posterior margin; central hump indistinct. Alae not reaching posterior margin of median segment.

Abdomen: Median segment about 2.5× longer than metanotum, almost 4× longer than wide. Segments II-VI cylindrical, slightly medially constricted and increasing in length, II 2.5×, VI 3.5× longer than wide. VII slightly shorter than VI, distinctly medially constricted and of bone-like appearance. Sternite II with a posteromedial pair of medium sized, straight spines. Tergite VIII strongly widening towards posterior margin, trapezoidal, slightly more than half the length of VII and with two oval depressions at anterior margin. IX strongly convex, constricted at posterior margin, as long as previous. Tergite X longer than IX, almost 1.5× longer than wide, parallel-sided with a blunt median keel in posterior half, posterior margin raised and with a broad but flat medial notch. Cerci obtuse, projecting over tergite X and slightly laterally compressed. Vomer broad, triangular, lateral margins raised and apically forked. Basal section brownish and tending to become green towards apex, margins yellowish. Poculum reaching posterior margin of tergite IX, strongly convex and with a fine, raised median keel which is extended into a rounded, laterally compressed lobe at the angle.

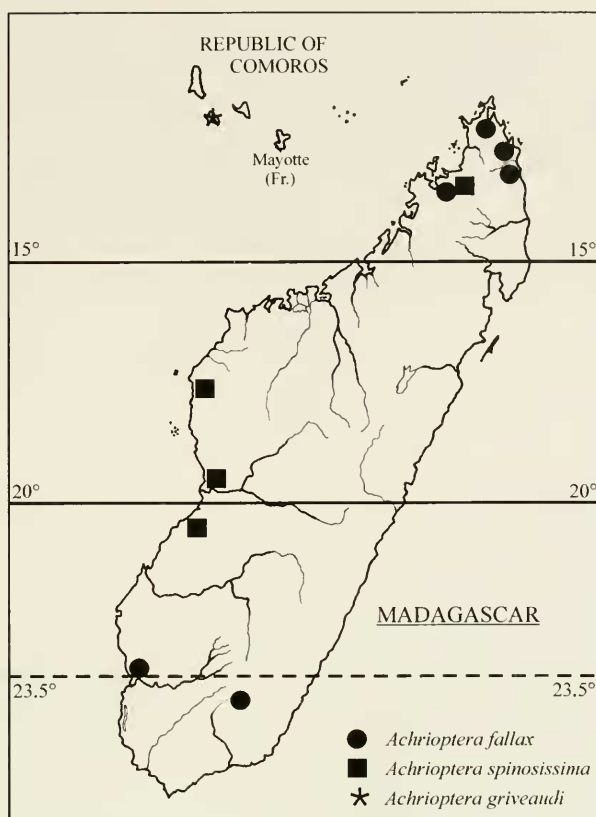
Legs: All moderately slender, mid legs projecting over tergite III, hind legs reaching posterior margin of tergite VII. Antero-dorsal carina of profemora raised but smooth, postero-ventral carina with 9-11 large triangular teeth. All carinae of protibiae slightly dilated, antero-dorsal carina slightly wave-like. Probasitarsus longer than following two tarsomeres combined. Mesofemora laterally compressed, ventral carinae with 7-10 large, irregular and triangular teeth, postero-dorsal carina with 5-10 triangular teeth, antero-dorsal smooth or occasionally with 1-2 minute teeth near base of femora. Ventral carinae of mesotibiae very minutely serrate, dorsal carinae smooth. Metafemora broadened, ventral carinae with 9-11 very prominent, long and pointed spines, dorsal carinae each with 4-6 triangular teeth in basal half. Each carina with an enlarged slightly lobe-like apical tooth; that of the postero-dorsal carina distinctly larger. Ventral carinae of metatibiae with several minute teeth in apical half, increasing in length towards apex of tibia, dorsal carinae smooth. Meso- and metabasitarsus longer than following two tarsomeres combined, ventral carinae usually with a single, minute tooth.

Variation: Adults show variation concerning size and the number and size of spines on the thorax as well as the length of the subgenital plate of ♀♀ (see description).

Egg (measurements in table 11): The following description is based on a dehydrated egg which was extracted from the ovipositor of the ♀ from the Orangéa Province, collected by J. PHINOT in MNHN and several live eggs laid by the ♀ collected by Dr. F. GLAW (ZSMC) at Parc National de Montagne des Français in 2004.

Table 1: Measurements (in mm) of *Achrioptera fallax* COQUEREL.

	♂♂ (MNHN)	♀♀ (MNHN)	♀ (ZSMC)
Body:	123.0-155.0	188.0-200.0	184.5
Body (including subgen. pl.):	–	203.5-210.6	188.0
Head:	6.2-7.1	9.8-11.3	10.7
Pronotum:	5.9-6.4	10.0-10.8	9.0
Mesonotum:	27.6-32.5	40.0-42.6	35.4
Metanotum:	6.0-6.5	6.8-7.2	6.0
Median segment:	13.5-19.0	19.5-23.0	19.4
Tegmina:	7.8-9.6	13.2-16.1	12.9
Alae:	15.0-20.0	24.1-26.0	24.0
Profemora:	19.0-20.5	24.0-26.3	22.8
Mesofemora:	16.5-21.5	23.1-23.6	23.0
Metafemora:	23.7-31.1	32.4-35.0	33.3
Protibiae:	19.0-21.3	22.4-24.3	22.6
Mesotibiae:	17.9-21.0	22.0-23.8	22.9
Metatibiae:	25.0-33.0	29.0-31.2	30.2
Antennae:	45.0-55.0	>42.0	49.0



Map 1: Distribution of *Achrioptera fallax* COQUEREL, *A. griveaudi* PAULIAN and *A. spinosissima* (KIRBY).

Of average size for the genus, general colour of capsule and micropylar plate pale straw, polar and opercular extensions slightly reddish brown. Capsule distinctly longer than wide, oval in cross-section; surface minutely rugulose. Polar end with a convex, hollow extension which has an obvious, irregularly raised longitudinal commissure. Micropylar plate elongate, lenticular and with both ends distinctly pointed; slightly paler straw than capsule. Micropylar cup slightly below centre of plate, scoop-like and with a rounded hump in its centre. Operculum slightly oval and with a large, hollow, conical process, similar to that of the polar end. Dorsally and ventrally with an impressed, roughly punctured seam and a flat, circular region in centre.

Comments: COQUEREL (1861: 495) described *Achrioptera fallax* from a single ♂ from Port Leven in Northern Madagascar for which he established the genus *Achrioptera*. Extensive research in MNHN by various people has so far not succeeded in tracing the type specimen. However, COQUEREL (1861: 495, pl. 9: 1) provided a nice illustration of the HT which clearly identifies his species. As long as there is no confirmation that the type is lost, it is undoubtedly best not to designate a neotype.

REDTENBACHER (1908: 440) provided a redescription of the ♂ based on a specimen in coll. PANTEL (MNHN) and one in NHMW, but the ♀ has since remained undescribed. There are four further, perfect ♂♂ of unknown locality in the exhibition of MNHN. These were only examined from a photograph and are not listed in the examined material.

Distribution (Map 1): Northern Madagascar (Province de Orangé; Port Leven; Diégo Surez; Montagne des Français) and Southern Madagascar (Tsimory, Sous-Préfecture d'Amboasary Sud at the foot of Massif de l'Ivakoany; Toirory).

Achrioptera gracilis sp. nov.
(Figs. 15, 26-28, 64-65, 87)

HT, ♀: Museum Paris, Madagascar, Ivohibe (1500 m), R. Degary 1926 (MNHN).

Systematic position and differentiation: The systematic position of *A. gracilis* sp. nov. is difficult to decide without knowledge of the ♂ and egg. The granulose but not spinose thorax, slightly convex head, long and slender, indistinctly serrate legs, short alae which do not project over the median segment and pinkish markings of the anal region of these organs indicate close relation to *A. pygmaea* REDTENBACHER.

A. gracilis sp. nov. is easily distinguished from the ♀♀ of all other members of the genus by: the distinctly raised and rounded dorsal carina of the probasitarsus, apically notched operculum and pinkish markings of the alae.

Etymology: The name (lat. slender) relates to the very slender and elongate body of the new species.

Description:

The ♀ HT is unique and complete except for the apices of both antennae and the two apical tarsomeres of both protarsi.

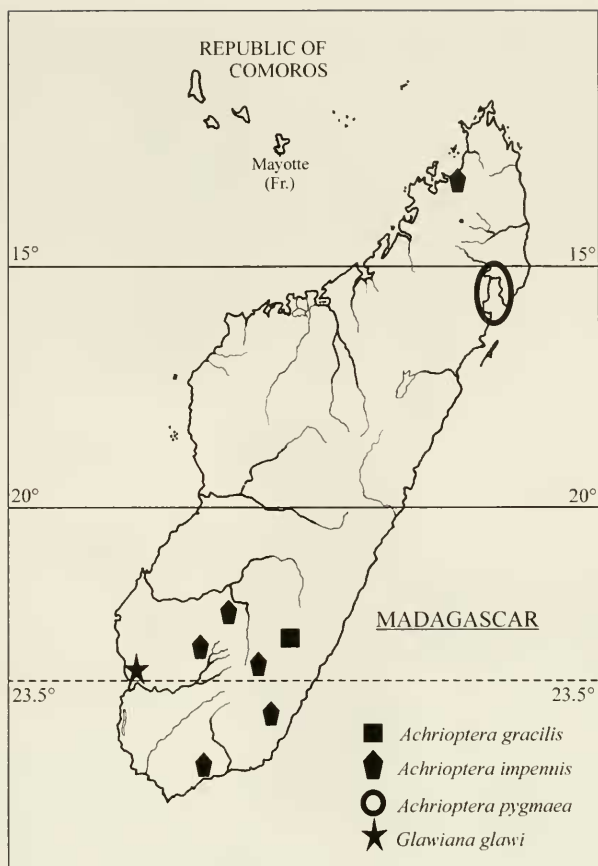
♀: Medium sized (body length 154.0 mm, including subgenital plate 178.0 mm) very elongate and slender (maximum body width 5.1 mm) species with a long (35.8 mm), tube-like subgenital plate and short alae (21.0 mm).

Colouration: General colouration of body and legs greyish or yellowish brown with a fine network of irregular white speckles, abdomen slightly darker and with distinctly less white speckles. Tergite IV with a bold white median line, V almost completely yellowish white. Anterior part of operculum whitish. Antennae yellowish brown. Eyes creamish orange-brown. Tegmina and costal area of alae plain greyish brown. Anal region of alae plain greyish brown with numerous indistinct, slightly darker transverse patches. Towards the cubital vein there are about ten large, almost circular transparent markings, decreasing in size radially. Anal areas 1 and 2 with four bold transverse, black bands, the exterior one being the narrowest. Spaces between the transverse bands pinkish.

Head: Subglobose, 1.5× longer than wide, broadest at the eyes. Vertex very slightly convex and with a few very indistinct and low granules. Between they eyes and just behind the bases of antennae with a raised transverse carina which has three minute medial depressions. Eyes circular and convex, slightly projecting from head capsule. Antennae (broken in the HT) at least equal in length to head, with more than 15 segments, all antennomeres except the three basal ones extremely shortened and distinctly broader than

Table 2: Measurements (in mm) of *Achrioptera gracilis* spec. nov.

	HT, ♀ (MNHN)
Body:	154.6
Body (including subgen. pl.):	178.0
Head:	6.9
Pronotum:	6.8
Mesonotum:	34.3
Metanotum:	4.7
Median segment:	16.9
Subgenital plate:	35.8
Tegmina:	8.7
Alae:	21.0
Profemora:	25.0
Mesofemora:	24.2
Metafemora:	30.0
Protibiae:	23.7
Mesotibiae:	20.6
Metatibiae:	25.2
Antennae:	>5.0



Map 2: Distribution of *Achrioptera gracilis* sp. nov., *A. impennis* REDTENBACHER, *A. pygmaea* REDTENBACHER and *Glawiana glawi* gen. nov., sp. nov.

long. Scapus trapezoidal, narrowing towards basal end, almost as long as broad. Pedicellus much shorter than scapus, spherical. Third antennomere slightly longer than pedicellus and strongly basally constricted. Thorax: Pronotum as long as head, slightly more than 1.5× longer than wide, very slightly medially constricted, anterior margin slightly broader than posterior margin. Anterior half with a slightly impressed and greyish median line and an impressed greyish lateral line. Median transverse depression slightly curved and almost reaching lateral margins of segment. Prosternum smooth. Mesothorax very elongate, cylindrical, very slightly broadened towards posterior margin and almost 3× longer than head and pronotum combined. Mesonotum parallel-sided with a hardly visible very fine median line and covered with numerous blunt granules. Mesopleurae and mesosternum covered with greyish brown granules similar to mesonotum. Metanotum more or less quadrate, metapleurae and metasternum covered with blunt granules. Tegmina oval, slightly convex with an indistinct central hump and projecting over posterior margin of metanotum. Alae almost reaching to posterior margin of median segment.

Abdomen: Median segment almost 4× longer than metanotum, 4× longer than wide, slightly medially constricted, smooth. Segments II-VI cylindrical and increasing in length, II less than 2×, IV 3.5× and VI 4× longer than wide. VII slightly shorter than previous bout distinctly narrower and 5× longer than wide. Tergite VI posterolaterally protuded into a small, slightly rounded lobe. Sternites II-VI smooth except for a pair of medial carinae near posterior margin. Praeopercular organ formed by a slightly scale-like and indistinctly raised posteromedial structure on sternite VII. Tergite VIII half the length of VII, 2.5× longer than wide, strongly convex and strongly medially constricted. IX indistinctly longer than wide, slightly more than half the length of VIII. Tergite X longer than IX, slightly narrowing towards apex and with a fine

longitudinal median carina. Posterior margin very slightly medially notched. Epiproct small rounded and with a minute posteromedial notch. Cerci brown, not projecting over posterior margin of tergite X, slightly laterally compressed and tapered towards apex. Subgenital plate very elongate and slender, projecting over the tergite X by the combined length of the four terminal tergites, strongly keeled over complete length, lateral margins upcurving and apex with a bold triangular notch.

Legs: All relatively slender and of moderate length, mid legs projecting over posterior margin of tergite III, hind legs almost reaching to posterior of tergite VII. Dorsal carina of profemora strongly raised and with 7-8 irregular, slightly truncate serrations, postero-ventral carina with a similar number slender, pointed teeth. Protibiae with all carinae slightly widened, the postero-dorsal carina slightly wave-like. Probasitarsus longer than following two tarsomeres combined (remaining tarsomeres broken) and with a raised and rounded dorsal carina. Ventral carinae of meso- and metafemora with 9-17 minute teeth, dorsal carinae only very sparingly covered with minute teeth. Postero-dorsal carina with a slightly triangular lobe near apex. Ventral carinae of meso- and metatibiae very densely but minutely serrate, dorsal carina smooth but slightly raised and rounded towards apex of tibia. Meso- and metabasitarsus as long as following three tarsomeres combined, dorsal carina indistinctly raised.

Comments: ♂♂ and eggs unknown.

Distribution (Map 2): Southeast Madagascar (Mount Ivohibe 1500 m).

Achrioptera griveaudi PAULIAN, 1960
(Figs. 8, 29, 67-68)

Achrioptera griveaudi PAULIAN, 1960: 272, fig. 1 (♀). HT, ♀: Moneli, Bandamalé 420 m, IX.-58, Raharizonina, Institute Scientifique, Madagascar dans l'estomac de *Leptosomus discolor*, *Achrioptera griveaudi* n. sp. Type (MNHN); PT, ♀: same data as HT (presumed in Comoro Is. – not examined).
CLIQUENNOIS, 2003a: 7.
ORTE & BROCK, 2003: 330. ("holotype, female")

Systematic position and differentiation: The long antennae, which are distinctly longer than the head and pronotum combined, multispinose head, elongate, apically tapered and pointed operculum and irregularly situated, transparent markings of the anal region of the alae show relation to *A. fallax* COQUEREL and *A. spinosissima* (KIRBY). Its exact systematic position is however difficult to decide without knowledge of the ♂ and egg.

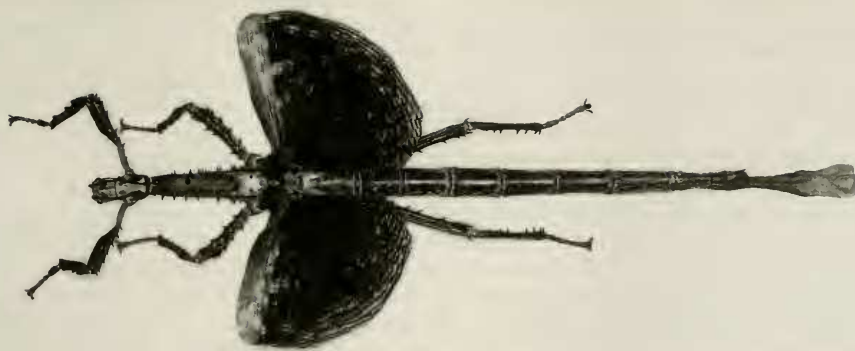
From *A. fallax* and *A. spinosissima* it differs by: the smaller number and size of the spines of the head and thorax, more slender legs which have the carinae of the fore legs much less prominently dilated and serrate; longer and more slender operculum and black anal region of the alae which exhibit a much smaller number of transparent markings.

Description:

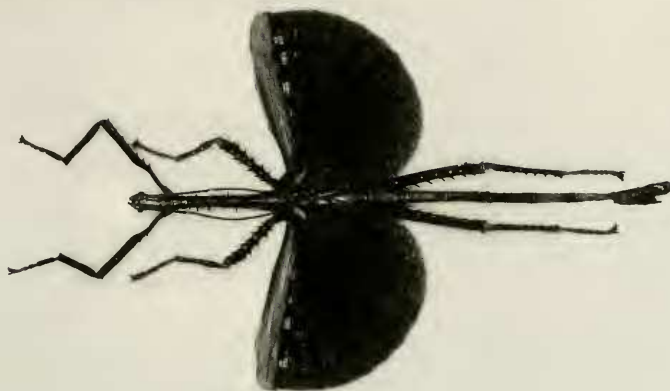
The ♀ HT in MNHN is strongly deformed and partly discoloured due to it was originally found in the stomach of a bird (*Leptosomus discolor*, Coraciiformes, Leptosomatidae). The PT was found alongside with the HT, but could not be examined. The mesothorax of the HT is strongly swollen and the abdomen shrunken. Both antennae are incomplete, but do perhaps only lack the terminal one or two segments. The following description is based on the HT only.

♀: Large (body length 185.0, including subgenital plate 205.0 mm), moderately slender (maximum body width 11.0 mm) species with long antennae (>38.0 mm), fully developed alae (47.0 mm), densely but minutely spinose head and thorax and a long, lanceolate subgenital plate.

Colouration: General colouration of body yellowish mid brown with irregular darker marking, pronotum and legs slightly greenish. Head with an indistinct straw longitudinal median line, postocular- and two infraocular lines. Basal 5-6 segments of antennae greenish mid brown, remaining pale reddish brown. Complete spination of thorax and legs yellow. Tegmina and costal region of alae dark straw with slightly lighter veins, anterior margin of the latter with a few bold irregular white markings. Tegmina becoming whitish towards apex. Anal region of alae black with several irregular transparent, transverse markings which become smaller and more sparing towards base.



5



6



7



8

Fig. 5-8. 5, *Achrioptera punctipes* (AUDINET-SERVILLE): ♀ (coll. FH). 6, *Achrioptera punctipes* (AUDINET-SERVILLE): ♂ (coll. FH). 7, *Achrioptera punctipes cliquennoisi* ssp. nov.: ♀, PT (MNHN). 8, *Achrioptera griveaudi* PAULIAN: ♀, HT (MNHN).

Head: Elongate, about 1.5× longer than wide, very slightly longer but of equal width to pronotum, parallel-sided. Vertex flat and each side of the median line set with three minute spines which are arranged in a triangle and numerous irregularly positioned minute tubercles. Between the bases of antennae with two oval, slightly raised areas and a broad median depression. Eyes circular, indistinctly projecting from head capsule, dark reddish brown. Antennae at least with 24 segments (broken in the holotype) and almost reaching posterior margin of mesonotum. Scapus indistinctly longer than wide, trapezoidal, narrowed towards base. Pedicellus cylindrical and slightly shorter than scapus, III almost 2× longer than pedicellus, remaining increasing in length.

Thorax: Pronotum almost 2× longer than wide, posterior margin broader than anterior margin. Median transverse depression very short and straight, not reaching lateral margins of segment. Median line impressed. Mesothorax about 1.5× the length of head and pronotum combined, elongate and cylindrical when alive (strongly swollen due to preservation). Mesonotum parallel-sided, with a fine median carina and set with several short, but broad yellowish black tipped spines, six spines at anterior margin placed in a transverse row. Metanotum slightly longer than wide, smooth. Mesopleurae with a few minute spines, metapleurae smooth. Meso- and metasternum set with numerous spines. Tegmina elongate, oval projecting over posterior margin of metanotum and with a very indistinct central hump. Alae reaching half way along tergite III.

Abdomen: Median segment about 1.5× longer than metanotum, 2× longer than wide and longer than tergite II. Segments II-VII almost of equal width, cylindrical and distinctly increasing in length, II indistinctly longer than wide, VII almost 2.5× longer than wide. Praeopercular organ formed by a pair of elongate, blunt spines near posterior margin of sternite VII. Tergite VIII narrower than VII and slightly more than half of its length, IX quadrate, half the length of VIII. Tergite X longer than IX, slightly broadening and flattened towards apex and with a fine median carina. Posterior margin with an indistinct medial notch. Epiproct rounded and projecting over tergite X. Cerci very small, cylindrical and tapered towards apices. Subgenital plate long, lanceolate, strongly keeled over complete length, apically tapered and rounded with lateral margins upfolded; projecting over posterior margin of tergite X by slightly more than the combined length of tergites VIII-X.

Legs: All relatively long and slender, mid legs projecting over posterior margin of tergite IV, hind legs reaching posterior margin of tergite IX. Antero-dorsal carina of profemora very slightly raised and with 5-6 very indistinct serrations which are restricted to the basal ⅓. Anteroventral carina with 8-9 very minute teeth, the apical one slightly lobe-like. All carinae of protibiae, except postero-dorsal one, very slightly raised, the antero-dorsal carina wave-like. Probasitarsus as long as following two tarsomeres combined. Mesofemora strongly laterally compressed, ventral carinae each with 6-7 medium teeth. Postero-dorsal carina with 7 triangular teeth, the apical one slightly raised and lobe-like, antero-dorsal carin smooth except for a single apical tooth. Ventral carinae of mesotibiae with 7-9 slender, triangular teeth, dorsal carinae

Table 3: Measurements (in mm) of *Achrioptera griveaudi* PAULIAN.

HT, ♀ (MNHN)	
Body:	185.0
Body (including operculum):	205.0
Head:	12.0
Pronotum:	11.5
Mesonotum:	33.0
Metanotum:	12.0
Median segment:	19.5
Tegmina:	18.7
Alae:	47.0
Profemora:	29.0
Mesofemora:	26.0
Metafemora:	38.0
Protibiae:	28.2
Mesotibiae:	26.0
Metatibiae:	37.5
Antennae:	>38.0

smooth and very slightly raised apically. Dorsal carinae of metafemora with a few very minute teeth in basal half. Ventral carinae each with 8-9 pointed spines which decrease in size towards apex of femora. Metatibiae dorsally smooth, ventral carinae each with 12-13 spines which are very minute and indistinct basally but increase in size towards apex of tibia and become very elongate and pointed. Mesobasitarsus slightly longer than following two tarsomeres combined, ventral carinae occasionally with a single minute spine.

Comments: PAULIAN (1960: 272) originally described *A. griveaudi* from two ♀♀. The PT is presumed to be in the Comoros and was not examined. Both the HT and PT were found in the stomach of a *Leptosomus discolor* (Coraciiformes, Leptosomatidae), a common, insect-eating and endemic bird species of that region. Due to the still very good condition of both specimens they could not have been in the stomach for too long, why PAULIAN (1960: 271) excluded a transport from Madagascar. In 2001 a specimen of *Leptosomus discolor* was observed holding an adult ♀ *Achrioptera griveaudi* PAULIAN in its beak (pers. communication with N. CLIQUENNOIS), which confirms PAULIAN'S suggestion and leaves no doubt about the presence of *Achrioptera* COQUEREL, 1861 in the Comoros.

♂♂ and eggs unknown.

Distribution (Map 1): Comoro Islands (Mohéli Id.: Bandamalé forest).

Achrioptera impennis REDTENBACHER, 1908
(Figs. 13, 14, 30-31, 49, 69)

Achrioptera impennis REDTENBACHER, 1908: 441. HT, ♂ (penultimate instar nymph): Museum Paris, Madagascar, Région del'Androy, Ambovombe, Dr. J. Decorse 1901, mars 01, Type, *Achrioptera impennis* Redt., Type (MNHN)

CLIQUENNOIS, 2003b: 5.

OTTE & BROCK, 2003: 330.

Material examined [1♂, 6♀♀, 7 nymphs]: 1♂: Madagascar, Nord, route du Haut Sambirano, 10 km d'Ambanja col du Bekaka 140 m, 16 et 17-XII-1963, p. Viette et P. Soga, Museum Paris; 1♀: Bekoky Sud, 13.II-63, Madagascar Sud, D. Winterbert re.; 1♀: Madagascar Sud Sud, Ranopiso, 12.XII.1967, D. Winterbert rec.; 1♀: Madagascar Centre Sud, 15 km S.W. Ranohira, 26.I.1968, D. Winterbert rec.; 1♀: Museum Paris, Madagascar (Isalo) Ilakaka, 26.III.1968, D. Winterbert; 2♀♀, 1♀, 1♂ (penultimate instar), 1♂ (nymph): Rahohna W, 12.VI.63, Site a tapias, Madagascar Sud, D. Winterbert rec.; 2♂♂ (nymph): Madagascar Sud Sud Quest, E. Anboasary, 13-XII-1967, D. Winterbert Rec, aero; 1♂ (nymph): Madagascar Centre-Sud, 15 km S.W. Ranohira, 26.I.1968, D. Winterbert Rec., anaero; 1♂ (nymph): Muséum Paris, Madagascar, Ranohira, 24.VI.63 Winterbert rec. (MNHN).

Systematic position and differentiation: The strongly reduced spination of the thorax and legs, rudimentary tegmina and alae, slender body and short antennae give *A. impennis* REDTENBACHER a quite isolated position within the genus.

Easily distinguished from all other members of the genus by: the short median segment, which is equal in length (♀) or even slightly shorter (♂) than the metanotum; unarmed and completely smooth ventral carinae of the meso- and metatibiae; flat and elongate head and the strongly rudimentary, scale-like tegmina and alae.

Description:

♀: Medium-sized to large (body length 144.0-182.0, including subgenital plate 158.0-202.5 mm) very slender species (maximum body width 6.0 mm) with a short median segment which is equal in length to the metanotum and strongly rudimentary alae (2.3-3.2 mm) and almost completely reduced tegmina.

Colouration: General colouration of body and legs varying from very pale greyish straw to almost dark brown and entirely covered with numerous, irregular whitish (yellowish in darker brown specimens) markings and speckles. Head with a longitudinal white median, two post- and two infraocular lines (these are very indistinct in darker brown specimens). Femora and tibiae each with two irregular more-or less indistinct greyish brown bands. Antennae, except scapus and pedicellus yellow. Granules or spines of thorax reddish brown. Costal region of alae mid to dark brown with pale markings, anal region plain red.

Head: Elongate, 1.5× longer than wide, very slightly narrowed towards posterior margin, broadest at eyes. Vertex flat and covered with several pointed granules, occasionally a further 1-2 more prominent,

blunt spines are present. Eyes reddish brown, circular and distinctly projecting from head capsule. Between bases of antennae with a very slight transverse depression. Antennae with 17 segments, slightly longer than head and pronotum combined. Scapus indistinctly longer than wide, trapezoidal, narrowed at base. Pedicellus slightly longer than scapus, cylindrical. Third antennomere as long as scapus, remaining slightly increasing in length.

Thorax: Pronotum slightly longer than head and almost 2× longer than wide, rectangular and very slightly narrowed medially. Median transverse depression indistinct, flat and reaching lateral margins of segment. Mesothorax very elongate, about 2.5× longer than head and pronotum combined, slightly constricted at anterior margin, broadened medially and covered with a variable number of blunt granules. Median line on mesonotum slightly raised in anterior half of segment. Metanotum less than half the length of mesonotum, either entirely smooth or with a small number of minute granules. Metapleurae and metasternum smooth. Tegmina almost completely reduced and only visible as a pair of very minute scale-like structures. Alae strongly reduced, at best covering about 1/5 of segment.

Abdomen: Median segment approximately of equal length as metanotum, smooth and more than 3× longer than broad. Segments II- VII parallel-sided but slightly narrowing and increasing in length, II shorter than median segment and about 2× longer than wide, VII 3× longer than wide, all smooth. Praeopercular organ formed by a pair of blunt granules at posterior margin of sternite VII. Remaining sternites smooth. Tergite VIII distinctly narrower and less than half the length of VII, almost 2.5× longer than wide and medially constricted. IX quadrate and less than half the length of VIII. Tergite X longer than IX, parallel-sided, with a faint median carina and a bold, concave emargination at posterior margin, lateral angles truncate. Epiproct rounded, keeled and slightly projecting over posterior margin of tergite X. Cerci small, cylindrical, tapered towards apices and reaching apex of epiproct. Operculum elongate, strongly keeled and projecting over apex of tergite X by about 1.5× the combined length of tergites VIII-X, apex rounded. Lateral margins strongly folded upwards and more or less distinctly opening towards apex of operculum.

Legs: All relatively slender and with strongly reduced armature, mid legs reaching posterior margin of tergite II, hind legs projecting over posterior margin of tergite VI. Antero-dorsal carina of profemora slightly raised with irregular, flat lobe-like extensions, postero-ventral carina with 5-6 triangular serrations. All carinae of protibiae, except postero-dorsal carina slightly dilated, postero-dorsal carina irregular and wave-like. Probasitarsus as long as following three tarsomeres combined, dorsal carina slightly raised and rounded. Ventral carinae of mesofemora with 5-6 pointed teeth, postero-dorsal carina with a few very minute teeth in basal half and a triangular-lobe-like extension near apex. Metafemora similar to mesofemora, but ventral carinae with 8-10 pointed teeth. Ventral carinae of meso- and metatibiae smooth but ending in a minute blunt apical tooth, antero-dorsal carinae slightly raised at apical end of tibia. Mesobasitarsus slightly longer than following two tarsomeres combined.

Table 4: Measurements (in mm) of *Achrioptera impeunis* REDTENBACHER.

	HT, ♂, nymph (MNHN)	♂ (MNHN)	♀♀ (MNHN)
Body:	98.0	111.0	144.0-182.0
Body (including subgen. pl.):	—	—	158.0-202.5
Head:	4.0	4.1	6.8-7.2
Pronotum:	4.8	4.6	7.0-7.7
Mesonotum:	24.2	26.8	35.0-40.5
Metanotum:	11.3	12.4	11.2-15.4
Median segment:	9.0	9.9	11.2-15.2
Tegmina:	—	—	—
Alae:	—	—	2.3-3.2
Profemora:	22.0	23.1	22.7-24.1
Mesofemora:	18.3	17.3	19.1-21.0
Metafemora:	22.1	22.8	23.0-25.5
Protibiae:	22.6	25.6	22.5-23.3
Mesotibiae:	17.1	16.2	17.0-19.9
Metatibiae:	22.0	19.3	21.6-23.3
Antennae:	> 21.0	> 33.3	17.7-25.0

♂: Medium-sized (body length 111.0 mm), very slender (maximum body width 2.1 mm), with the median segment shorter than the metanotum and without tegmina or alae.

Colouration: General colouration of body and legs reddish mid brown and all over covered with numerous irregular whitish or greyish markings and speckles. Antennae greyish mid brown.

Head: Generally as ♀♀ but vertex only with a very few, minute granules and eyes relatively larger and strongly projecting from head capsule. Antennae with more than 14 antennomeres and at least reaching $\frac{2}{3}$ the way along mesonotum. Otherwise as ♀♀ but antennomeres more elongate.

Thorax: Pronotum as ♀♀. Mesothorax very elongate, very slightly broadened at posterior margin, almost 5× longer than head and pronotum combined and completely destitute of granules. Metathorax smooth. Metanotum slightly less than half the length of mesonotum, smooth, parallel-sided and about 6× longer than wide. Tegmina and alae completely reduced and only visible as minute scale-like structures.

Abdomen: Median segment slightly shorter than metanotum, smooth and parallel-sided, about 5× longer than wide. Segments II-VII all parallel sided, of equal width and length, about 3.5× longer than wide. Tergites and sternites smooth. Tergite VIII narrower and slightly longer than half the length of VII, strongly convex and medially constricted. IX, the length of previous and about 1.5× longer than wide. Tergite X very slightly longer than IX, strongly keeled and tectiform, posterolateral angles slightly tapered. Cerci small, cylindrical, incurving and projecting over tergite X. Poculum not reaching posterior margin of tergite IX, convex and cup-like with a blunt and slightly lobe-like extension in its centre.

Legs: All very slender and relatively long, mid legs reaching posterior margin of tergite III, hind legs almost reaching apex of abdomen. Armature generally as ♀♀ but spination of meso- and metafemora much less distinct and carinae of fore legs only very slightly raised. Probasisitarsus as long as remaining tarsomeres combined, meso- and metabasisitarsus as long as combined length of following three tarsomeres.

Variation: Comparison of the six ♀♀ in MNHN shows the species to exhibit considerable variation concerning the spination of the head and thorax as well as size and colouration. The head is covered with a variable number of minute, pointed granules but may occasionally bear a further 1-2 much more prominent blunt spines. The number and size of the granules of the mesothorax is strongly variable. The metanotum may be completely smooth or set with several granules similar to those of the mesothorax. Colour varies from very pale straw to dark brown. The numerous pale marking of the body and legs are whitish in pale brown specimens and yellowish in darker brown specimens. Dark brown specimens may further lack the white longitudinal lines of the head. For size variation see table 4.

Comments: REDTENBACHER (1908: 441) described *Achrioptera impennis* from a single ♂ in MNHN. Examination has proven this to be merely a penultimate instar nymph. Further research in the collection revealed a series of *A. impennis* REDTENBACHER from Southern Madagascar, most of which were collected by D. WINTERBERT during the 1960's. This included the so far unknown ♀ and adult ♂ as well as nymphs of different stages. A live ♀ was examined from a beautiful photograph taken by Sonja RIBES (IRSM) in the Parc National de l'Isalo near Ranohira. Eggs unknown.

Distribution (Map 2): Southern Madagascar, dry mountainous and lowland regions (Region de l'Androy, Ambovombe; Ranopiso; Parc National de l'Isalo; Rahohna; Bekoky; Est Anobasari). The single adult ♂ in MNHN is the only specimen of *A. impennis* to be recorded from Northern Madagascar (Ambanja, near Nosy Be).

Achrioptera lobipes (REHN, 1940) comb. nov.

(Figs. 11, 51)

Hovaspectrum lobipes REHN, 1940: 3, figs. 1-2 (♂). HT, ♂: Madagascar ? (from Lambertson), Amboyna, Molucca I'lds,

Hovaspectrum lobipes J.W.H. Rehn, Type, 5631 (ANSP)

OTTE, 1978: 79.

CLIQUENNOIS, 2003b: 5.

OTTE & BROCK, 2003: 330.

Systematic position and differentiation: Without knowledge of the ♀ and egg, the systematic position of *A. lobipes* (REHN) is difficult to decide. The strongly dilated carinae of the profemora and -tibiae, long alae and evenly tuberculate metasternum indicate relation to *A. punctipes* (AUDINET-SERVILLE) and *A. magnifica* sp. nov.

Easily distinguished from all other members of the genus by the postero-dorsal and -ventral carinae

of the profemora being only but prominently raised in the apical half of the femora. Furthermore, it differs from *A. punctipes* (AUDINET-SERVILLE) and *A. magnifica* sp. nov. by the distinctly smaller body-size; tubercles instead of distinct spines of the meso- and metathorax and unarmed meso- and metapleurae.

Description:

The ♂ HT in ANSP is unique and lacks both antennae and protarsi.

♂: Small (body length 94.0 mm) and moderately slender species (maximum body width 3.0 mm) with long alae (28.0 mm).

Colouration: General colour of body dark olive-brown to plain yellowish drab. Head greyish mid brown with a white postocular, infraocular and median line. Lateral margins of pronotum green, mesopleurae greyish white, meso- and metasternum dark green with lateral margins white, metapleurae brownish with the ventrolateral margins whitish. Complete spination of thorax green. Abdominal tergites yellowish drab, sternites II-VII dull drab with lateral margins white and posterior margins black. Tergites VIII and IX with a bold yellow marking at lateral margin. Profemora dull olive basally and becoming dark reddish brown towards apex, posterior and anterior surfaces with white speckles. All tibiae, meso- and metafemora dark reddish brown, all speckled and occasionally blotched with white. Armature of meso- and metafemora orange. Tegmina dull greenish brown and with a bold pale yellowish green longitudinal stripe along anterior margin. Costal region of alae with anterior margin creamish pale yellow, remaining parts dull reddish brown becoming slightly purplish towards the base and with indistinct purplish markings in apical half. Anal region ochraceous-orange with black markings.

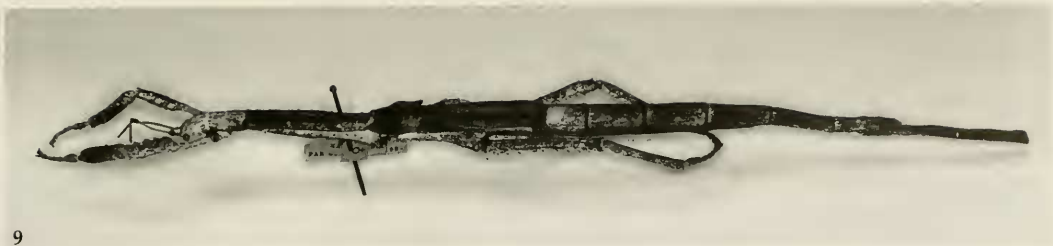
Head: Rectangular, 1.5× longer than wide, broadest at eyes; these quite prominent and convex. A shallow, slightly impressed median line, visible over complete length. Scapus dorsoventrally flattened, indistinctly longer than wide, trapezoidal and narrowed towards base. Remaining antennomeres missing.

Thorax: Pronotum slightly longer than head, 2× longer than wide, smooth and parallel-sided. Median transverse depression indistinct, anterior half of segment with a submarginal, elongate impression. Prosternum unarmed, longitudinally grooved and medially constricted. Mesothorax very elongate, slightly longer than 2× the combined length of head and pronotum and slightly widening at posterior margin. Mesonotum with a few irregularly distributed low tubercles, which are restricted to the anterior ¼ of segment. Meso- and metasternum irregularly covered with tubercles. Meso- and metapleurae smooth. Tegmina short, oval. Alae slightly projecting over posterior margin of tergite III.

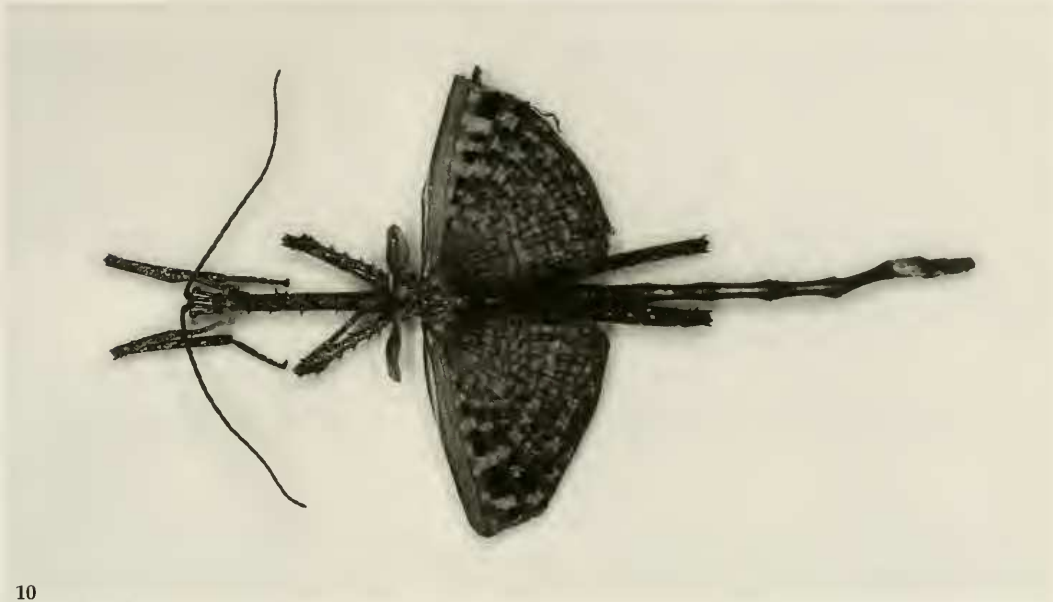
Abdomen: Median segment, longer than metanotum, smooth. Segments II-VII of almost equal width, slightly medially constricted and increasing in length (2.5 to 4× longer than wide). Tergite X slightly longer than wide, with a slight posteromedial emargination, lateral angles rounded. Anterior ⅓ with a fine median carina. Vomer broad, triangular, bi-dentate; orange brown. Cerci small, tapered and indistinctly projecting over posterior margin of tergite X. Poculum convex, cup-like and with an indistinct, longitudinal lobe at the angle.

Table 5: Measurements (in mm) of *Achlrioptera lobipes* (REHN).

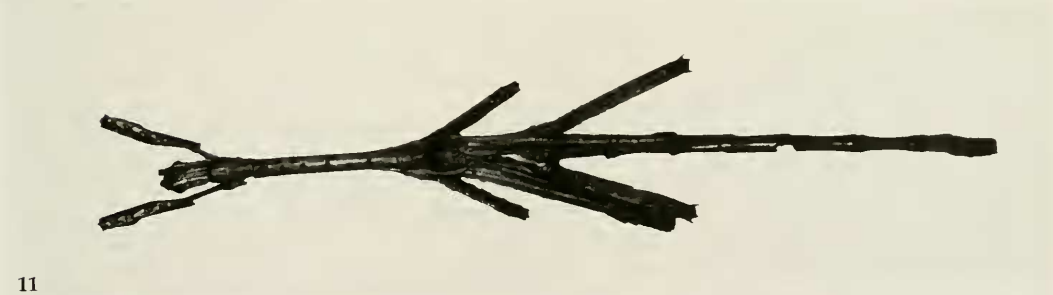
	HT, ♂ (ANSP)
Body:	94.0
Head:	5.2
Pronotum:	4.9
Mesonotum:	18.9
Metanotum:	4.5
Median segment:	9.7
Tegmina:	7.0
Alae:	28.0
Profemora:	14.5
Mesofemora:	11.1
Metafemora:	16.8
Protibiae:	11.3
Mesotibiae:	9.0
Metatibiae:	14.5



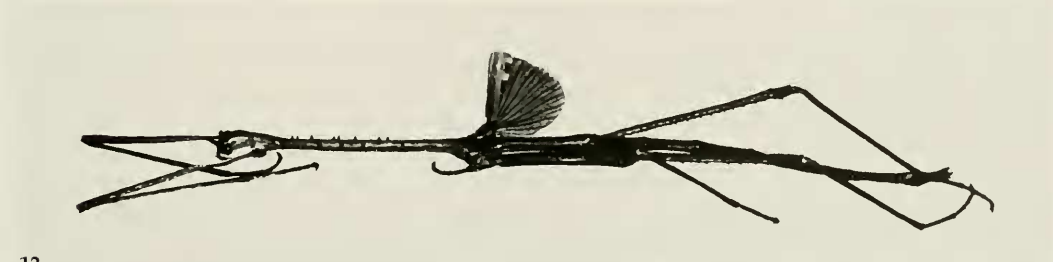
9



10

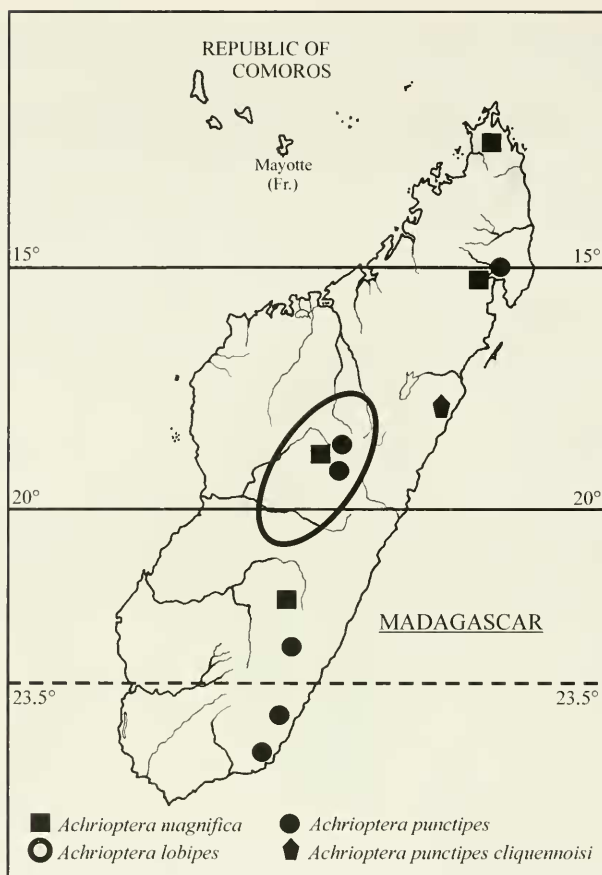


11



12

Figs 9-12. 9, *Achrioptera magnifica* sp. nov.: ♀, PT (MNHN). 10, *Achrioptera magnifica* sp. nov.: ♂, HT (MNHN). 11, *Achrioptera lobipes* (Rehn): ♂, HT (ANSP). 12, *Achrioptera pygmaea* REDTENBACHER: ♂, LT (NHMW).



Map 3: Distribution of *Achrioptera lobipes* (REHN), *A. punctipes* (AUDINET-SERVILLE), *A. punctipes cliquennoisi* ssp. nov. and *A. magnifica* sp. nov.

Legs: All relatively short, profemora slightly less than 3× the length of pronotum; mesofemora reaching posterior margin of median segment; metafemora reaching half way along tergite IV. Postero-dorsal carina of profemora only raised in apical half of femur and with three prominent serrations. Postero-ventral carina with a prominent, rounded dilation in apical half of femur which bears five large, lobe-like serrations, the basal one positioned quite separately. Protibiae distinctly shorter than femora, slightly longer than 2× the length of the pronotum and with all carinae distinctly dilated. Mesofemora with six minute teeth on postero-dorsal carina, increasing in length towards apex of femur and six very minute teeth on postero-ventral carina. Metafemora with six low tubercles on postero-dorsal carina, postero-ventral carina with 11-12 minute spines, showing a marked tendency to biseration in length and 12-13 similar teeth on anteroventral carina. Meso- and metatibiae shorter than corresponding femora, dorsal carinae smooth but slightly raised, ventral carinae spinose and slightly widening towards apex of tibia. Basitarsi longer than following two tarsomeres combined.

Comments: ♀♀ and eggs unknown.

Distribution (Map 3): Central Madagascar, Hova (according to REHN, 1940: 3). The Hovas are the tribes which inherit the central region of Madagascar (REHN, 1940: 1, footnote 1).

Achrioptera magnifica sp. nov.
(Figs. 9, 10, 20-22, 44-45, 65-59, 76-77, 83)

Achrioptera punctipes, REDTENBACHER, 1908: 440 in part, pl. 20: 5a-d (♂, ♀ misidentified specimens from MNHN)

HT, ♂: Collection Chuillat, Madagascar, Tananarive, Collection Le Moul, *Achrioptera punctipes* ♂ (MNHN);
PT (2♂♂, 2♀♀, 1 egg): 1♂: Mount D'Ambre, Madagascar, collect Dr. Siccard; 1♂: Maroancetra, Madagascar, 12.1897, Déterminé par C. Brunner 1899, *Achrioptera punctipes* Serv., Collection A. Finot, *Finotia magnifica* Redt, ♂; 1♀: ♀, Madagascar, Déterminé par C. Brunner, 1899; 1♀, 1 egg: Museum Paris, Madagascar, Makjakendziana, Bernard, 1906, *Achrioptera punctipes* Serv. (MNHN); 1♂: Maroancetra, Madagascar, Collection A. Finot det. Br. v. W. *Achrioptera punctipes* Serv. (NHMW).

Systematic position and differentiation: Very closely related and presumably the sister taxon of *A. punctipes* (AUDINET-SERVILLE). Apart from a striking similar general appearance common features are: the very elongate, apically flattened and truncate, spatula-like subgenital plate, strongly dilated, dorsally lobate carinae of the profemora and fully developed alae of ♀♀.

It differs from *A. punctipes* and *A. punctipes cliquennoisi* ssp. nov. by: the smaller size and more slender body; relatively longer mesothorax; lighter brown anal region of the alae which have the anal areas 1 and 2 with distinct, bold black and creamish ochraceous-orange markings as well as pale reddish to yellowish brown antennae of both sexes; shorter antennomeres; much less prominent, dark greyish green spines of the mesothorax; slightly shorter alae; more elongate and slender, parallel-sided subgenital plate of ♀♀ and plain yellowish to greenish brown general colouring; black spines of the mesothorax; brown tegmina and costal region of the alae and less distinct lobe of the subgenital plate of ♂♂. Furthermore the eggs are clearly distinguished by: the smaller size; less laterally compressed capsule; lower dorsal rib and less prominent opercular and polar extensions.

Etymology: The specific name "*magnifica*" (lat. great) is overtaken from the unpublished name which BRUNNER v. WATTENWYL suggested for this species.

Description:

♀: Medium sized to large (body length 156.5-176.0, including subgenital plate 183.0-203.0 mm) very slender (maximum body width 7.0 mm) species with short antennae (16.0 mm), a very long, spatula-like subgenital plate (45.0-47.0 mm), moderately long alae (31.0-35.5 mm) and relatively short and broadened legs.

Colouration: General colour of body and legs yellowish or greyish mid to dark brown with numerous, irregular white markings, speckles and spots, especially on thorax, legs and tarsi. Head almost entirely yellowish or greyish white, with seven white longitudinal lines. Complete spination and armature of the body and legs dark greyish green; spines of the thorax with black points. Eyes reddish brown. Antennae pale yellowish brown, become darker brown towards apices. Tegmina and costal region of alae yellowish to greyish mid brown with several very indistinct paler markings and pale straw or greyish veins. Tegmina slightly whitish towards the apex; alae with a bold but indistinct, pale anterobasal marking. Anal region of alae mid brown, with many transparent, transverse spots, arranged in irregular transverse bands; these become gradually smaller and less distinct towards the wing base. Anal areas 1, 2 and 3 with 4-6 bold, transverse glossy black markings, which decrease in size towards the wing base. Spaces between these creamy ochraceous-orange.

Head: Elongate, subcylindrical, 1.5× longer than wide, parallel-sided. Vertex flat and smooth except for a few minor granules. Median line depressed at posterior margin. Eyes small, circular and strongly convex. Antennae just reaching to posterior margin of pronotum, with 26 joints, all relatively short and stout. Scapus quadrate, slightly dorsoventrally flattened and constricted towards base. Pedicellus slightly transverse, half the length of scapus, cylindrical. Third antennomere twice the length of pedicellus, IV-V very short, transverse, only half the length of III. V transverse, VI quadrate, following increasing in length. Thorax: Pronotum about as long and broad as head, rectangular, almost 2× longer than wide. Median line fine but impressed, median transverse depression curved but not reaching lateral margins of segment. Prosternum smooth. Mesothorax almost 2× longer than head and pronotum combined, parallel-sided and very slightly broadening at posterior margin. Complete surface of mesothorax, metanotum and metapleurae set with numerous minute, pointed tubercles or short spines of variable size. Mesonotum with a fine median carina. Metanotum indistinctly longer than wide. Tegmina oval, with a blunt central hump and just

projecting over posterior margin of metanotum. Alae slightly projecting over posterior margin of tergite II.

Abdomen: Median segment $2\times$ longer than metanotum and $2\times$ longer than wide. Segments II-VII parallel-sided and increasing in length, II $1.5\times$, VII almost $3\times$ longer than wide. Sternite II with a pair of minute spines at posterior margin, remaining sternites smooth. Praeopercular organ formed by a blunt medial granule at posterior margin of sternite VII. Tergite VIII about half the length of VII, distinctly narrower, medially compressed and strongly convex; $2\times$ longer than wide. IX half the length of VIII, slightly longer than wide, strongly convex. Tergite X longer than IX, with a fine median carina and a minute concave medial notch at posterior margin. Epiproct very small, rounded and keeled. Cerci very small, cylindrical and distinctly tapered towards a pointed apex. Subgenital plate very elongate, projecting over tergite X by about the combined length of tergites VII-X, spatula-like. Basal half keeled and laterally compressed, posterior half flattened, parallel-sided and apex truncate or very slightly rounded.

Legs: All relatively short and stout, mid legs reaching half way along tergite III, hind legs just reaching posterior margin of tergite VI. Degree of armature strongly variable (see variation). Antero-dorsal carina of profemora strongly raised with five broad but pointed, foliaceous teeth. Postero-ventral carina with 13-15 prominent, pointed, triangular teeth which distinctly increase in size and become foliaceous towards the apex of the femora. Antero-dorsal carina of protibia strongly raised and irregularly lobate; ventral carinae broadly dilated but smooth. Probasisitarsus with all carinae distinctly dilated and rounded; as long as following two tarsomeres combined. Ventral carinae of mesofemora each armed with 8-9 pointed teeth; postero-dorsal carina with 7 triangular teeth of variable size (the apical one slightly larger than the remaining; antero-dorsal carina with 4-5 minute teeth, the apical one slightly enlarged. Ventral carinae of mesotibiae with 8-12 very minute spines in apical half which increase in size towards apex of tibia. Dorsal carina smooth, but raised and slightly rounded near base and apex of tibia. Metafemora slightly broadened towards base; ventral carinae each with 9-12 minute to prominent, pointed spines; dorsal carinae with only a few minute teeth. Dorsal carina of metatibiae smooth, ventral carinae each armed with either many very minute spines or 7 prominent, straight and pointed spines which increase in length towards apex of tibia. Meso- and metabasisitarsus as long as following three tarsomeres combined, ventral carinae with 1-3 minute teeth.

♂: Medium sized (body length 111.0-112.5 mm), moderately slender (maximum body width 3.2 mm) species with spinose thorax, long antennae (36.5 mm) and alae (33.0-33.6 mm).

Colouration: General colour of body and legs yellowish or greenish mid to dark brown. Posterior margin of mesosternum, anterior margin of metasternum, prosternum, tergite VII and sternites II-VII whitish. Tergite IX with a longitudinal white marking at alteral margins. Legs all over covered with numerous white spots (less numerous on metatibiae). Head with a white median line; on each side with three irregular longitudinal white lateral lines. Antennae pale reddish brown. Spines of mesothorax black with dark green bases, of metathorax dark greyish green. Tegmina and costal region of alae plain reddish mid brown, veins greyish brown. Tegmina with a bold longitudinal white stripe close to anterior margin. Costal region of alae with a bold, longitudinal white stripe near anterior margin, which begins close to the base and runs about $\frac{3}{4}$ the way along alae. Anal region as in ♀♀.

Head: Generally as in ♀♀, but without granules on vertex. Eyes more strongly projecting from head capsule. Antennae projecting over posterior margin of mesonotum, with 26 segments. Scapus and pedicellus as in ♀♀. Third antennomere as long as pedicellus, IV transverse. Following relatively longer than in ♀♀, increasing in length towards apices of antennae.

Thorax: Pronotum generally as in ♀♀, but median transverse depression more prominent, V-shaped and almost reaching lateral margins of segments. Mesothorax almost $2\times$ longer than head and pronotum combined, parallel sided. Metanotum $1.5\times$ longer than wide. Mesonotum armed with numerous prominent, pointed spines, mesosternum with 8, metasternum with 10 slightly less prominent, paired spines. Mesopleurae smooth; metapleurae with a longitudinal row of 4-5 medium spines and a supra-coxal spine. Tegmina elongate, $2\times$ longer than wide, oval and with a slightly raised central hump; just projecting over posterior margin of metanotum. Alae reaching half way along tergite IV.

Abdomen: Median segment distinctly longer than metanotum, $2\times$ longer than wide, smooth. Segments II-VI medially constricted, very slightly increasing in length; in average $3\times$ longer than wide. Tergite VIII $\frac{2}{3}$ the length of VII and almost twice the width; slightly widening towards posterior margin and less than $1.5\times$ longer than wide. IX shorter than VIII, strongly convex and narrowed towards the posterior. Tergite X slightly shorter than VIII and widening towards posterior margin which is truncate and has a triangular, medial notch. Median carina very faint. Cerci cylindrical, tapered and bristled. Vomer triangular, with a

raised outer margin and apical spines blunt; blackish. Poculum convex, just reaching posterior margin of tergite IX, keeled in posterior half and with a distinct, rounded and laterally compressed lobe at the angle.

Legs: All relatively short, mid legs reaching posterior margin of tergite III, hind legs reaching posterior margin of tergite VIII. Antero-dorsal carina of profemora with 5-6 very minute teeth, postero-ventral carina with 9-11 triangular teeth of variable size. All carinae of protibiae slightly dilated, dorsal carina very slightly wave-like. Probasitarsus as long as following four tarsomeres combined, dorsal carina slightly raised towards apex. Armature of mid- and hind legs generally as in ♀♀ but less prominent.

Variation: The two ♀♀ paratypes in MNHN show several features to be subject of strong intraspecific variation. The spination of the thorax and armature of the legs of the smaller specimen from coll. FINOT (illustrated by REDTENBACHER, 1908, pl. 5: b-d) are conspicuously less distinct and developed to a much lesser degree than in the larger specimen from Makjakendziana (= Manjakandriana) in the main collection (compare figs. 56 and 57). While the spines of the mesothorax and metasternum are distinct and pointed in the large ♀ they are reduced to small, pointed tubercles in the small specimen. Furthermore, the ventral serrations of the metatibiae are considerably reduced to very minute spines and just a few major spines at the apex of the tibia, while there 7 distinct, long and pointed spines which gradually increase in length towards the apex of the tibia in the ♀ from Manjakandriana. The latter specimens also has the ventral spines of the mesofemora much more prominent. The ♂ HT and three PT do not show such significant variation.

Egg (measurements in table 11): A single, fully developed egg was extracted from the ovipositor of the ♀ PT from Makjakendziana (= Manjakandriana). It however shows some damage: the polar extension is partly broken off or was destroyed by parasites, as is the abdomen of the insect.

Large, general colour yellowish or reddish mid brown. Capsule about 1.5× longer than wide, oval in cross-section, complete surface strongly punctured with the intervening regions raised. Polar end with a distinct, crown-like, hollow extension (broken in the unique example). Dorsal surface with a prominently raised, irregular longitudinal keel, which includes the micropylar plate; ventral surface with a less distinct median keel. Dorsolaterally a more slender, longitudinal carina which is distinctly curved at the micropylar plate. Lateral surfaces with a slender, slightly curved longitudinal carina. All keels run the complete length of the capsule. Micropylar plate small, oval and with both ends tapered; centrally impressed. Micropylar cup placed almost in centre of plate, cup-like. Operculum oval and with a very prominent, hollow, irregularly shaped, tube-like extension.

Comments: Examination of the specimens (3♂♂ and 2♀♀) in MNHN which BRUNNER v. WATTENWYL identified as *Achrioptera punctipes* (AUDINET-SERVILLE) has proven these to represent a distinct and still

Table 6: Measurements (in mm) of *Achrioptera magnifica* spec. nov.

	HT, ♂ (MNHN)	PT, ♂♂ (MNHN)	PT, ♀♀ (MNHN)
Body:	111.0	112.5	156.5-176.0
Body (including subgen. pl.):	–	–	183.0-203.0
Head:	5.7	6.3	8.9-9.2
Pronotum:	5.8	6.3	8.8-9.3
Mesonotum:	23.0	22.6	27.9-32.4
Metanotum:	6.1	6.2	7.2-8.7
Median segment:	9.8	10.1	16.7-18.1
Subgenital plate:	–	–	45.0-47.0
Tegmina:	10.0	8.3	11.4-15.1
Alae:	33.6	33.0	31.0-35.5
Profemora:	19.7	18.0	18.2-20.5
Mesofemora:	15.8	15.2	16.6-17.9
Metafemora:	23.0	23.1	24.0-28.9
Protibiae:	17.0	16.1	13.5-18.2
Mesotibiae:	13.9	12.7	13.0-16.9
Metatibiae:	21.1	18.8	19.8-24.2
Antennae:	36.5	–	> 16.0

undescribed species. Subsequently REDTENBACHER (1908: 440) listed and figured the ♂ and ♀ (plate 20: 5a-d) as *A. punctipes* in the monograph. The measurements for the ♀ and smaller measurements for the ♂ provided by REDTENBACHER concern to the misidentified MNHN specimens and consequently to *A. magnifica* sp. nov. A ♂ from the collection of M. FINOT bears a handwritten label of BRUNNER v. WATTENWYL with the unpublished name "*Finotia magnifica* Redt."

Distribution (Map 3): Tropical regions of Central Madagascar (Antananarivo & Sous-Préfecture de Manjakandriana) and Northern Madagascar (Montagne d'Ambre & Maroantsetra).

Achrioptera punctipes (AUDINET-SERVILLE, 1838)
(Figs. 5, 6, 17-19, 40-43, 52-55, 78-80, 84, 85, 89)

Cyphocrana ? *punctipes* AUDINET-SERVILLE, 1838: 239. HT, ♂: «Côtes d'Afrique, coll. M. Marchal», Purchased and pres. '73 by Mrs. F.W. Hope, *Cyphocrana* ? *punctipes* Audinet-Serville Type, Type. Audinet-Serville (OXUM, No. 619).

DEHAAN, 1842: 117.

Cyphocrania ? *punctipes*, WESTWOOD, 1859: 110.

WESTWOOD, 1864: 205 (erroneous synonymization with *A. fallax* COQUEREL, 1861)

Achrioptera punctipes, KIRBY, 1904: 394.

CLARK-SELICK, 1998: 226, figs. 41e & f (egg – micropylar plate).

CLIQUENNOIS, 2003b: 5.

OTTE & BROCK, 2003: 330.

Achrioptera composita CARL, 1913: 42. HT, ♂: no data (MHNG) **syn. nov.**

ZOMPRO & BROCK, 2003: 9.

CLIQUENNOIS, 2003b: 5.

OTTE & BROCK, 2003: 330.

Achrioptera intermedia REDTENBACHER, 1908: 440. HT, ♂: Route Laborde, entre Andrangavolo et Ambahanahia (forêt), Museum Paris, Madagascar, G. Grandidier 1899, 26. Janv. 99, Type, *Achrioptera intermedia* Redt., Type. (MNHN) **syn. nov.**

CLIQUENNOIS, 2003b: 5.

OTTE & BROCK, 2003: 330.

Achrioptera sp., HENNEMANN, 1994: 6, figs 1-7 (♂, ♀, nymph and egg)

[**not** *Achrioptera punctipes*, REDTENBACHER, 1908: 440, pl. 20: 5a-d (♂, ♀), **misidentification** (= *Achrioptera magnifica* spec. nov.)]

Material examined [14♂♂, 12♀♀, 1♀ (nymph), eggs]: 1♂: Madagascar, Rogez, Museum Paris 1931, Lasére; 1♂: Madagascar-Est, Ambodivoangy 20 m, det Maroantsetra, X.59, J. Vadou, Institute Scientifique, Madagascar; 2♀♀: without data; 1♂: Madagascar, Rogez, Forêt Côte Est, Museum Paris, XII.1953, A. Seyrick; 1♂: Museum Paris, Madagascar, Fort Dauphin, E. Fairmaire 1901, *Achrioptera punctipes* Serv. (MNHN); 2♀♀, 1♀ (penultimate instar): ex Zucht: F. Kirsten, 1993, urspr.: Madagaskar, Fianarantsoa (FH 0178-1, 2 & 4); 2♀♀, 1♂; 22 eggs: ex Zucht: F. Hennemann, 11.1995, urspr.: Madagaskar, Fianarantsoa (FH 0178-3, 8, 9, E & ED); 1♀, 2♂♂: Zentral Madagaskar, Antananarivo region, leg. Peyrieras 1. 1983 (FH 0178-5 to 7); 1♂, 1♀: Madagaskar, 2003 (coll. OC); 1♂, 1♀: ex Zucht, Madagaskar, Gefriertrocknung (NHMB); 1♂: Madagascar, *Achrioptera punctipes* Serv. ♂; 2♂♂, 3♀♀: Madagascar, *A. intermedia* Redtb. (MHNG); 1♂: Madagascar (from Lamberton), *Achrioptera intermedia* Redt. ♂, Det. Hebard 1923, A.N.S.P. (ANSP); 1♂: S. Central Madagascar, Hildebrandt, *Enatia spinosissima* Kirby, (ZMHB).

Systematic position and differentiation: Very closely related and presumably the sister taxon of *A. magnifica* sp. nov. Apart from a striking similar general appearance common features are: the very elongate, apically flattened and truncate, spatula-like subgenital plate and strongly dilated, dorsally lobate carinae of the profemora and fully developed alae of ♀♀.

It differs from *A. magnifica* sp. nov. by: the larger and more robust body; relatively shorter mesothorax; darker brown anal region of the alae which have the anal areas 1 and 2 with distinct, bold black and white or very slightly greenish markings; more prominent and longer bright green spines on the mesothorax and red antennae of both sexes; more elongate antennomeres; relatively shorter, apically broadened and truncate operculum; greenish or yellowish brown general colouring of ♀♀ and green and red tegmina and costal region of alae as well as a different colouring of ♂♂ (bright green, yellow, red and white). Furthermore the eggs are clearly differ by: the larger size; more strongly laterally flattened capsule; more prominent dorsal rib and relatively larger opercular and polar extensions.

From the new subspecies *A. punctipes cliquennoisi* **ssp. nov.** it is distinguished by: the relatively shorter mesothorax, 26 instead of 28 antennomeres and differently coloured anal region of the alae of both sexes which exhibits less transparent markings which are all whitish or very slightly greenish or bluish instead of bright orange. Furthermore, ♀♀ differ by the entirely (except three basal segments) dark red antennae and yellow ventral spination of the profemora; ♂♂ by: the more robust body and legs, green tegmina; green and basally dark red costal region of the alae; red mesopleurae; lack of a white median line on mesonotum and entirely yellow abdominal segments II-VII.

Description:

The colouration of both sexes is described from photographs of live captive reared specimens.

♀: Large to very large (body length 184.5-223.7, including subgenital plate 206.7-258.3 mm), colourful and moderately broad (maximum body width 10.0-11.5 mm) species with relatively short mesothorax (32.2-36.8 mm), long subgenital plate (42.8-58.0 mm) and alae (45.0-53.5 mm) and relatively short antennae (25.0-30.5 mm).

Colouration: General colour of body, fore- and hind legs greyish, yellowish or slightly greenish pale to mid brown with an irregular, bold whitish posterior marking, irregular white markings on abdomen and a bold, transverse white band at the base of the operculum. Sternite II almost completely white, II-VI with a bold, transverse white band at anterior margin and a brown band at posterior margin. Complete spination of thorax bright green with black points; spines on vertex yellow with points first green then black. Mesofemora greenish and becoming brown towards apex; front- and mid legs with numerous white spots; ventral surface of metafemora pale red. Ventral spines and teeth of profemora bright yellow, of metafemora pale red. Dorsal teeth of metafemora green; remaining armature orange to pale red. Head capsule whitish ventrolaterally; with a white median line and three irregular longitudinal white lateral lines. Usually with a much shorter and indistinct postocular line. Antennae dark red; scapus, pedicellus and basal half of third antennomere yellowish brown. Metapleurae with a large irregular white marking in anterior half. Tegmina and costal region of alae glabrous, reddish brown and becoming green towards apex. The latter with an irregular white basal marking at anterior margin and a slight purplish wash; occasionally with several irregular paler markings; ventral surfaces bright pink towards base. Anterior margin of tegmina indistinctly whitish. Anal region of alae greyish black, with numerous transverse transparent r very slightly greenish or bluish patches, arranged in irregular transverse bands; these are largest at the exterior margin and soon become more indistinct towards the wing base. Anal areas 1, 2 and 3 with 3-5 bold rectangular, glossy black markings, the interior one being the narrowest. Spaces between the transverse bands creamish white.

Head: Elongate, almost 1.5× longer than wide, cylindrical, parallel-sided. Vertex smooth or with 1-2 minute spines. Eyes circular and slightly projecting from head capsule; dark reddish brown. Antennae reaching about 1/3 the way along mesonotum, with 26 segments, scapus almost quadrate and slightly dorsoventrally compressed, pedicellus indistinctly longer than broad, cylindrical and shorter than scapus. Third antennomere slightly longer than pedicellus, IV transverse, V and VI slightly shorter than III.

Thorax: Pronotum about as long and broad as head, almost 1.5× longer than wide and medially constricted. Median line depressed but interrupted where it is crossed by the slightly curved median transverse depression; the latter reaching lateral margins of segment. Prosternum smooth. Mesothorax cylindrical, elongate, 1.5× longer than head and pronotum combined, all over covered with prominent spines. Mesonotum with a very fine and indistinct median carina. Metanotum quadrate, metapleurae and metasternum set with numerous, large spines; those of the pleurae arranged in a longitudinal line. Tegmina slightly trapezoidal, convex and just projecting over posterior margin of metanotum. Alae projecting over posterior margin of tergite II.

Abdomen: Median segment 1.5× longer than wide, and 1.5× longer than metanotum, rectangular. Segments II-VI of equal width, cylindrical and very slightly increasing in length, II indistinctly longer than wide and VI slightly more than 2× longer than wide. VII narrower but longer than previous, almost 3× longer than wide. Sternite II with a pair of medium sized spines at posterior margin. Praeopercular organ formed by a pair of low, longitudinal carinae at posterior margin of sternite VII. Tergite VIII about half the length of VII, strongly convex and medially constricted, 1.5× longer than wide. IX quadrate, half the length of VIII. Tergite X slightly longer than IX, with a fine median keel in posterior half and a triangular posteromedial notch. Epiproct very small, rounded and strongly keeled. Cerci very short, not reaching posterior margin of tergite X, cylindrical and tapered towards apices. Subgenital plate very long, anteriorly keeled, posteriorly flattened and more or less strongly broadened and truncate; projecting over tergite X

by at least the combined length of tergites VII-VIII.

Legs: All relatively short and stout, mid legs slightly projecting over tergite III, hind legs reaching half way along tergite VII. Antero-dorsal carina of profemora strongly raised and with 3-5 rough, truncate serrations, postero-ventral carina with 8-13 pointed, triangular serrations. All carinae of protibiae dilated, antero-dorsal carina usually with three irregular, truncate lobes. Probasitarsus as long as following two tarsomeres combined, dorsal carina very indistinctly raised. Mesofemora distinctly laterally compressed, ventral carinae each with 8-12 triangular teeth, postero-dorsal carina with 6-8 triangular teeth of different sizes, the apical one slightly larger than the remaining. Antero-dorsal carina with 4-5 minute teeth, the apical one usually slightly enlarged. Ventral carinae of mesotibiae with 8-11 straight, pointed spines, dorsal carinae smooth, but slightly raised towards base and apex. Metafemora slightly broadened towards base, ventral carinae with 9-14 long, pointed spines, dorsal carinae only with a few minute teeth. Dorsal carinae of metatibiae smooth, ventral carinae with 10-14 straight and pointed spines increasing in length towards apex of tibia. Meso- and metabasitarsus as long as following two tarsomeres combined, ventral carinae with 1-3 minute teeth.

♂: Medium sized (body length 129.0-149.0 mm), moderately stout (maximum body width 6.5-6.8 mm) and very colourful species with long alae (42.3-49.0 mm) and long antennae (47.0-53.0 mm). Complete surface of body and legs strongly glabrous.

Colouration: Head, dorsal surface of pronotum, complete abdomen except median segment, pro- and metatibiae, basal and apical sections of mesotibiae and all tarsi bright yellow. Bases of profemora, medial section of mesotibiae and metapleurae dark green. Mesonotum, meso- and metafemora bluish green. Mesopleurae, meso- and metacoxae as well as ventral surfaces and spination of metafemora bright red. Meso- and metasternum pale yellowish brown. Complete spination of thorax dark green with black points. Tergites VII and IX with a bold white marking at lateral margins. Sternites II-V with a transverse white band on anterior margin. All legs more or less densely covered with small white dots. Head with a white median line and 3 irregular, longitudinal white lateral lines. Usually there is a further much shorter and more indistinct postocular line. Latero-ventral surfaces whitish. Antennae red; scapus, pedicellus and basal half of third antennomere yellow. Tegmina and costal region of alae dark bluish green and becoming dark purplish towards the bases. The latter occasionally with several indistinct pale markings. Tegmina with a bold, white longitudinal stripe which begins at the base and afterwards diverges from it and gradually disappears about $\frac{2}{3}$ the way along tegmina. Posterior margin with an indistinct pale marking near apex from which occasionally a bold, white diagonal stripe runs towards the base of the tegmina. Costal region of alae with a broad, white subcostal stripe which becomes fainter and gradually disappears about $\frac{3}{4}$ the way along alae. Anal region plain greyish black with indistinct black cross-veins. Anal areas 1-2 (and occasionally 3) with 3-4 bold transverse, glossy black bands, the interior one being the narrowest. Spaces between the transverse bands creamish white.

Head: Generally as in ♀♀, but eyes more prominent and strongly projecting from head capsule. Between the bases of antennae with a slightly raised, smooth, oval area. Vertex smooth or with 1, 2 or 3 minute spines. Antennae with 26 segments, reaching to posterior margin of metanotum, otherwise as in ♀♀.

Thorax: Pronotum as in ♀♀. Mesothorax elongate, 2× longer than head and pronotum combined. Mesonotum with a very indistinct median line and set with 10-20 prominent, pointed spines, mesopleurae smooth except for 1-3 spines near mesocoxae. Mesosternum with 7-12 prominent spines. Metanotum quadrate, metapleurae with a longitudinal row of 5-7 pointed spines, metasternum with 6-8 paired spines. Tegmina elongate, slightly trapezoidal and projecting over posterior margin of metanotum. Alae reaching half way along tergite IV.

Abdomen: Median segment almost 2× longer than metanotum, rectangular, 3× longer than wide. Segments II-VII cylindrical, medially constricted, bone-like and slightly increasing in length, II 2×, VI-VII 3× longer than wide. Sternite II with a pair of spines near posterior margin. Tergite VIII half the length of VII, slightly broader, 1.5 longer than wide, rectangular. IX $\frac{2}{3}$ the length of VIII, slightly longer than wide, rectangular and strongly convex. Tergite X indistinctly longer than IX, slightly tapered towards apex, with a fine median carina in posterior half and a triangular notch at posterior margin. Cerci slightly projecting over posterior margin of tergite X, cylindrical and strongly tapered towards apex. Vomer broad, triangular and with two blunt points, one being distinctly shorter than the other. Poculum convex, just reaching posterior margin of tergite IX, strongly keeled in posterior half and with a large, rounded and laterally compressed lobe at the angle.

Legs: All relatively short and stout, mid legs almost reaching anterior margin of tergite V, hind legs reaching half way along tergite IX. Antero-dorsal carina of profemora with 3-4 minute, triangular teeth, postero-ventral carina with 6-7 large, triangular teeth. All carinae of protibiae dilated, antero-dorsal carina usually with three indistinct, truncate lobes. Probasitarsus as long as following three tarsomeres combined, dorsal carina slightly raised towards apex. Armature of mid- and hind legs generally as in ♀♀.

Variation: Due to its wide distribution *A. punctipes* (AUDINET-SERVILLE) shows to be quite variable in a number of features. Apart from large size ranges of both sexes and the size of the body spination, the armature of the head, intensity of the patterns of the hind wings and colouration of the ♂ tegmina show strong variation. In his key, REDTENBACHER (1908: 439) distinguished between the different species using the number of spines of the head, but breeding has shown this feature to underlie strong intraspecific variability in *A. punctipes*. They may either be completely lacking or there are one, two or occasionally even three equally sized spines. The bold diagonal white stripe of the tegmina of ♂♂ is either indistinct or very prominent, running the complete length of the tegmina.

Nymphs: The penultimate instar ♀ nymph in coll. FH is of a plain mid brown general colouring. The head already shows the typical longitudinal white lines and the mesothorax is all over covered with minute, pointed tubercles. The subgenital plate is laterally folded up and strikingly tube-like, a typical feature for ♀♀ nymphs of *Achrioptera*. Newly hatched nymphs have a body length of 24 mm. The body is a uniform dark brown, the antennae are reddish brown and the bases of all basitarsi white.

Egg (measurements in table 11): The following description is based on numerous eggs laid by cultured specimens.

Very large, general colour pale straw when dehydrated, greyish or greenish brown when recently laid. Capsule 2× longer than wide, laterally compressed, oval in cross-section; surface distinctly punctured. Polar end of capsule with a prominent, hollow, crown-like extension. This with a variable number of either irregularly shaped or almost circular holes. Dorsal surface of capsule with a very prominent longitudinal keel which begins at the operculum and ends at the anterior end of the micropylar plate. Keel all over covered by numerous irregular, raised radial ridges, impressions and blunt humps. Lateral surfaces of capsule with a longitudinal row of rounded granules and humps. Ventral surface tectiform. Micropylar plate slender, elongate with both end tapered and a central, knob-like micropylar-cup. Operculum oval and with a very prominent, raised, crown-like extension which ends in a dorsal and ventral peak.

Table 7: Measurements (in mm) of *Achrioptera punctipes* (AUDINET-SERVILLE).

	HT, ♂ of <i>A. intermedia</i> (MNHN)	♂♂	♀♀	♀, penultimate instar (FH)
Body:	132.0	129.0-149.0	184.5-223.7	161.8
Body (including subgen. pl.):	–	–	206.7-258.3	180.1
Head:	7.8	6.0-7.4	10.0-13.1	7.8
Pronotum:	6.9	4.7-7.3	10.4-11.3	8.2
Mesonotum:	26.3	24.6-27.0	32.2-36.8	26.3
Metanotum:	–	6.8-7.7	10.0-12.3	10.1
Median segment:	–	12.0-13.5	17.1-19.0	13.3
Subgenital plate:	–	–	42.8-58.0	33.0
Tegmina:	11.7	12.0-13.9	17.8-20.3	–
Alae:	47.5	42.3-49.0	45.0-53.5	–
Profemora:	21.6	21.6-24.1	24.6-28.9	18.1
Mesofemora:	18.7	19.3-20.6	23.3-24.8	15.0
Metafemora:	26.2	21.4-29.0	33.3-37.5	24.2
Protibiae:	19.7	19.9-22.0	21.8-24.8	15.0
Mesotibiae:	16.1	17.2-18.8	21.3-23.9	13.6
Metatibiae:	22.5	22.0-25.0	28.3-33.0	20.8
Antennae:	>36.0	47.0-53.0	25.8-30.5	13.1

Comments: AUDINET-SERVILLE (1838: 239) originally described *Cyphocrana? punctipes* from a single ♂ in OXUM. The HT is labelled “In Africa?”, which is undoubtedly an erroneous record. Examination of the ♂ holotypes of *Achrioptera composita* CARL, 1913 in MHNG and *Achrioptera intermedia* REDTENBACHER, 1908 in MNHN has shown both taxa to be junior synonyms of *Achrioptera punctipes* (AUDINET-SERVILLE).

Examination of three ♂♂ and two ♀♀ in MNHN which BRUNNER V. WATTENWYL identified as *Achrioptera punctipes* (AUDINET-SERVILLE) and which were later described and illustrated by REDTENBACHER (1908: 440, pl. 20: 5a-d), have proven to be a distinct and still undescribed species (see *Achrioptera magnifica* **sp. nov.**). *A. punctipes* is quite common and sometimes sold by local insect suppliers as “*Achrioptera madagascariensis*”, which is an unpublished name. Culture stock was originally imported from Fianaransoa, Central Madagascar during the late 1980’s but has proven difficult to maintain in culture for a longer period. In some cases however, breeding was successful for some generations, using guava (*Psidium guajava*, Myrtaceae), oak (*Quercus robur* and *Q. ilex*, Fagaceae) and bramble (*Rubus* spp., Rosaceae) as alternative foodplants. It has subsequently been included on the Phasmid Study Group species-list as culture No. 149 “*Achrioptera* sp.” but has since remained unidentified. The culture stock died out in the late 1990’s. A report on breeding, biology and behaviour as well as characterizations and illustrations of the insects and eggs were provided by HENNEMANN (1994).

Distribution (Map 3): Eastern half of Madagascar, mainly mountainous but also coastal tropical regions (Antananarivo; Rogez; Fort Dauphin; Ambodivoangy, Maroantsetra; Route Laborde entre Andrangavolo et Ambahanahia and Fianarantsoa).

Achrioptera punctipes cliquennoisi **ssp. nov.**
(Figs. 7, 50, 90)

HT, ♂: Northeast Madagascar, Tamatave, Manompana, forêt d’Ambodiriana, lowland forest 100-200 m, leg. N. Cliquennois 15.III.2003 (MNHN).

PT, 2♀♀, 26 eggs: 1♀, 16 eggs: same data as HT, 19.III.2003 (MNHN); 1♀ (in copula with HT), 4 eggs: same data as HT (ZSMC); 6 eggs: same data as HT (coll. FH 0550-E).

Differentiation: Distinguished from the nominate form by: the relatively longer mesothorax and different colouration of the anal region of the alae of both sexes which has a larger number of transverse transparent spots all of which are more or less intensely orange. Furthermore, ♀♀ differ by: the greyish green antennae which become reddish only towards the apices; orange ventral spination of the profemora, meso- and

Table 8: Measurements (in mm) of *Achrioptera punctipes cliquennoisi* **ssp. nov.**

	HT, ♂ (MNHN)	PT, ♀♀
Body:	131.0	207.0-210.0
Body (including subgen. pl.):	–	240.5-243.0
Head:	6.2	10.5
Pronotum:	7.0	11.5-12.0
Mesonotum:	27.5	39.0-40.5
Metanotum:	13.0	12.0-13.0
Median segment:	8.0	16.0-17.0
Operculum:	–	54.5-58.5
Tegmina:	10.5	16.5-19.0
Alae:	41.0	51.0-52.0
Profemora:	21.5	24.0-25.0
Mesofemora:	18.0	23.5
Metafemora:	26.0	33.0-34.5
Protibiae:	20.5	19.5-23.5
Mesotibiae:	16.5	20.0-21.5
Metatibiae:	22.0	26.0-29.5
Antennae:	54.0	28.5-30.0

metatibiae; green armature of meso- and metafemora, darker green spination of the thorax and sternites II-VI being whitish with a reddish brown transverse band at posterior margin. ♂♂ differ by: the more slender body and legs; brown tegmina; brown and apically pink costal region of the alae; whitish mesopleurae; white median line of the mesonotum and green abdominal segments II-VII which all have a yellow transverse band on their posterior margin.

Etymology: This beautiful subspecies is dedicated to its collector N. CLIQUENNOIS (La Réunion), member of the ADEFA (Association de défense de la forêt d'Ambodiriana), for providing his specimens for examination, help in locating historic collecting sites and good cooperation.

Characterization:

♀: Very similar to the nominate form but differing by the features mentioned above.

Head smooth except for a pair of minute tubercles on vertex. Antennae with 26-28 segments. Pronotum and prosternum unarmed. Mesonotum all over set with pointed spines of variable sizes. Mesosternum with 8 prominent paired spines and 1-4 further spines towards the posterior. Metasternum with 17-26 irregularly set spines. Mesopleurae with 3-12 medium spines; metapleurae with 8-12 irregularly set spines. Sternite II with two spines close to posterior margin (lacking in one PT); remaining sternites unarmed. Praeopercular organ formed by two very indistinct, blackish humps at posterior margin of sternite VII.

♂: Similar to the nominate form but easily distinguished by the features mentioned above. The following description of the colouration is based on several colour photographs of the live HT taken by N. CLIQUENNOIS (La Réunion).

Colouration: Head, pronotum, profemora, all tibiae and apices of femora yellowish brown. Mesonotum, metapleurae, meso- and metafemora dark bluish green. Meso- and metasternum and complete spination of thorax dark green; metasternum with an indistinct longitudinal white line at lateral margin. Mesopleurae whitish. Head with a distinct white median line and three less distinct lateral lines; posterolateral margins white. Pronotum with two, subparallel yellowish lines and a dark green lateral line. Mesonotum with a whitish median line, widening towards anterior and posterior margins of segment. Abdominal segments II-VII mid green, each with a bold transverse yellow band at posterior margin; tergites with a longitudinal, yellow posterolateral marking. VIII-X yellow; VIII and IX with a distinct white marking at lateral margin. Cerci black. All legs completely covered with small white spots. Antennae dark red. Tegmina mid brown with a bold white line along anterior margin and a whitish marking at posterior margin. Costal region of alae dark brown basally but soon becoming more pale and bright pink towards the apex; with a bold white subcostal line and a further much less distinct medial whitish line. Anal region dark brown with numerous, transverse slightly orange, transparent markings which become larger towards the outer margin of alae. Anal areas 1-2 black with 4 distinct, rectangular, orange markings; 5-6 with two bold, transverse black markings.

Head smooth except for a pair of minute granules on vertex. Antennae with 26 segments. Mesonotum with 12 irregularly set, mesosternum with 9 paired prominent spines, mesopleurae smooth. Metasternum with 7 distinct spines, metapleurae with a row of 3 minute spines.

Egg (measurements in table 11): Very similar to the nominate form, but slightly larger. The opercular and polar extensions are seen to be relatively larger and more distinctly structured. The colour is in average seen to be a slightly darker greyish brown (dehydrated).

Comments: An adult ♀ as well as an adult ♂ and ♀ in copula were collected by N. CLIQUENNOIS (La Réunion) at Ambodiriana forest in northeast Madagascar, a nature reserve managed by the ADEFA (Association de défense de la forêt d'Ambodiriana). The two ♀♀ laid several eggs which were sent to Mrs. K. RABAËY (Belgium) for breeding purposes. They hatched after an incubation of eight months but the nymphs refused all alternative foodplants offered and used for culturing *A. punctipes* (AUDINET-SERVILLE).

Distribution (Map 3): Northeast Madagascar (Tamatave, Manompana, forêt d'Ambodiriana).

Achrioptera pygmaea REDTENBACHER, 1908
(Figs. 12, 47-48, 88)

Achrioptera pygmaea REDTENBACHER, 1908: 440. LT [by present designation], ♂: Coll. Br. v. W., Antongil, Madagasc. Mocqueris leg., det Br. v. W. *Achrioptera pygmaea*, 22.318 (NHMW, No. 845); PLT, ♂: Coll. Br. v. W., Antongil, Madagasc. Mocqueris leg., det Br. v. W. *Achrioptera pygmaea* (NHMW, No. 845)
CLIQUENNOIS, 2003b: 5.
OTTE & BROCK, 2003: 330.

Systematic position and differentiation: The systematic position of *A. pygmaea* is difficult to decide without knowledge of the still unknown ♀ and egg. The globose head; long and slender, indistinctly serrate legs; short alae which do not project over the median segment and pinkish markings of the anal region of these organs indicate close relation to *A. gracilis* sp. nov., which is only known from the ♀.

A. pygmaea REDTENBACHER differs from the ♂♂ of all other members of the genus by: the globose head, poor degree of leg armature and pinkish markings of the alae.

Description:

♂: Small (body length 85.5-96.0 mm) and slender (maximum body width 2.2 mm) species, with median segment distinctly longer than the metanotum and tegmina and alae reduced, with the latter reaching to the posterior margin of the median segment (11.6-12.6 mm); antennae long (26.0 mm).

Colouration: General colouration of body and legs yellowish or slightly greenish mid brown, legs with several indistinct pale greyish spots. Mandibles and lateroventral section of head white, vertex with a longitudinal white line just above the eyes. Antennae greyish black. Pronotum with a white spot at the anterolateral angles. Lateral margins of mesonotum with an irregular, broad greyish black longitudinal band, meso- and metapleurae greyish brown with darker speckles. Tergite IX with a whitish posterolateral marking. Spines of the mesonotum and posterior margins of coxae bright red, spination of mesosternum and armature of the legs black. Tegmina and costal region of alae greyish brown. Apices of the alae white and the posterior margin of the tegmina with an indistinct greyish white medial marking. Anal region of alae plain greyish brown with some very indistinct, slightly darker transverse patches. First anal area plain pink, second anal area with three bold transverse, black bands, the exterior one being the narrowest, spaces between the transverse bands pink.

Head: Globose, slightly longer than wide and broadest at the eyes. Vertex very slightly convex and with a few very indistinct and minute granules. Between the eyes and just behind the bases of antennae with a broad, transverse and C-shaped depression. Eyes dark reddish brown, circular, strongly convex projecting from head capsule. Antennae (broken in the lectotype) slightly longer than head and pronotum

Table 9: Measurements (in mm) of *Achrioptera pygmaea* REDTENBACHER.

	LT, ♂ (NHMW)	PLT, ♂ (NHMW)
Body:	85.5	96.0
Head:	4.2	4.2
Pronotum:	3.0	3.0
Mesonotum:	21.8	23.0
Metanotum:	2.8	3.1
Median segment:	12.5	13.9
Tegmina:	4.2	5.0
Alae:	11.6	12.6
Profemora:	21.3	22.2
Mesofemora:	18.6	19.5
Metafemora:	22.8	24.0
Protibiae:	20.0	21.8
Mesotibiae:	16.1	18.0
Metatibiae:	20.1	22.2
Antennae:	>2.3	26.0

combined. Scapus trapezoidal, narrowing towards basal end and 1.5× longer than broad. Pedicellus half the length of scapus. Third antennomere almost as long as scapus and pedicellus combined, following increasing in length.

Thorax: Pronotum about $\frac{3}{4}$ the length of head and distinctly narrower, medially constricted and anterior margin broader than posterior margin. Median transverse depression distinct and curved. Mesothorax very elongate and slender, slightly more than 3× the combined length of head and pronotum. Mesonotum with a very fine longitudinal median carina and armed with 15-17 blunt spines, posterior quarter of segment unarmed. Mesosternum with 7 minute paired spines, metasternum, meso- and metapleurae smooth. Tegmina oval, slightly convex with an indistinct central hump and slightly projecting over posterior margin of metanotum. Alae almost reaching to posterior margin of median segment.

Abdomen: Median segment 3× longer than metanotum, parallel-sided. Segments II-VII all with an indistinct longitudinal keel and slightly medially constricted. II-VI slightly increasing in length, II 3.5×, VI 4.5× longer than wide, VII slightly shorter than VI. Sternites smooth. Tergite VIII about half the length of VII, strongly convex and broadened at posterior margin. IX $\frac{2}{3}$ the length of VIII, medially constricted, keeled and with anterior margin broader than posterior margin, laterally with a longitudinal raised ridge. Tergite X with a fine median carina, as long as IX and with a triangular medial incision at posterior margin, angles rounded. Cerci slightly projecting over posterior margin of the tergite X, cylindrical and constricted towards apex. Poculum convex, cup-like and not reaching the posterior margin of tergite IX.

Legs: All relatively slender and of moderate length, mid legs projecting over posterior margin of tergite IV, hind legs projecting over apex of abdomen. All femora slightly thickened apically. All carinae of profemora smooth, except postero-ventral carina which bears 4-5 minute teeth. Protibiae with all carinae smooth. Probasitarsus as long as remaining tarsomeres combined. Ventral carinae of mesofemora with 10-12 teeth of variable size. Postero-dorsal carina with 4-5 minute teeth in and both the antero- and postero-dorsal carinae with a low triangular lobe near apex. Ventral carinae of metafemora with 24-26 minute, pointed teeth (occasionally with another very minute teeth at their bases). Postero-dorsal carina with 6-7 minute teeth, otherwise as in mesofemora. All carinae of mesotibiae smooth, except postero-ventral carina which bears 3-4 very minute serrations towards apex of tibia. Postero-ventral carina of metatibiae with 27-29 very minute serrations, remaining carinae smooth. Postero-dorsal carina slightly rounded at apex of tibia. Meso- and metabasitarsus as long as remaining tarsomeres combined, except claw.

Comments: ♀♀ and eggs unknown.

Distribution (Map 2): Northeast Madagascar (Antongil Bay = Maronatsotra region)

Achrioptera spinosissima (KIRBY, 1891)

(Figs. 3, 4, 32-33, 46, 70, 72, 81-82, 91)

Enetia spinosissima KIRBY, 1891: 151. HT, ♀: South-west Madagascar, Mourondava, Mr. T. Last leg. (BMNH).

KIRBY, 1904: 394.

Achrioptera spinosissima, REDTENBACHER, 1908: 339 (description of ♂)

CLIQUENNOIS, 2003b: 5.

OTTE & BROCK, 2003: 330.

Material examined [1♂, 2♀♀, eggs]: 1♂: Museum Paris, Madagascar, Bélo, E. Doury 1901, Museum Paris, Madagascar, Bélo-sur-Tsiribihina, E. Doury 1901, *Enetia spinosissima* Kirby ♂ (MNH); 1♀, 7 eggs: Nord Madagascar, Montagne des Français, der Küste zugeneigter Hang 100-200 m, 12°18'45"S, 49° 20'23"E, leg. F. Glaw II. 2003 (ZSMC); 1♀, eggs: Nord Madagascar, Montagne des Français, der Küste zugeneigter Hang 100-200 m, 12°18'45"S, 49°20'23"E, leg. F. Glaw II. 2004 (ZSMC).

Systematic position and differentiation: Differing from all other members of the genus by the spinose pronotum and prominent spines on sternites II-VII.

Closely related to the type-species *A. fallax* COQUEREL from Northern Madagascar with which it shares the multispinose vertex, long antennae and spines of the prosternum of ♀♀ as well as the plain, glabrous bluish green body colouring and bright orange ventral carinae of the femora of ♂♂. From *A. fallax* it however differs by: the larger size; lack of an enlarged apical tooth on the dorsal carinae of the meso- and metafemora; much longer alae which have the anal region greyish black with a variable number of pale bluish green, slightly translucent spots arranged in irregular transverse bands of both sexes as well as the

different colouration and greater number of spines on the mesothorax of ♂♂.

The long alae and large size resemble *A. punctipes* (AUDINET-SERVILLE) from Central and Southeastern Madagascar. In addition to the typical features mentioned above it differs from *A. punctipes* by: the multi-spinose head; spinose prosternum; more densely spinose mesothorax; anal region greyish black with a variable number of pale bluish green, slightly translucent spots arranged in irregular transverse bands of both sexes; as well as the bluish green, much longer antennae; distinctly shorter, apically tapered and pointed operculum of ♀♀ and different colouration of ♂♂.

Description:

The colouration of both sexes is described from photos of live specimens.

♀: Very large (body length 221.8-238.0 mm, including subgenital plate 232.0-253.0 mm), very colourful and moderately slender (maximum body width 10.0-12.0 mm) species with long antennae (>51.0-76.0 mm), fully developed alae (54.0-55.0 mm) and densely spinose thorax and head.

Colouration: General colour of body pale yellowish to greyish brown with irregular lighter markings and longitudinal lines on abdomen. Antennae, maxilles and operculum glabrous bluish green. Femora straw, with knees dark dark green; bases of profemora green. All tibiae and tarsi dull green or slightly bluish; femora and tibiae all over covered with small white spots. Coxae red. Head with three longitudinal white lateral lines and a slender, white median line; ventrolaterally with a slightly orange longitudinal band. Eyes reddish or bluish black. Pronotum with all margins green, interior surface greyish brown with a white longitudinal lateral line. Meso- and metapleurae dark green; mesopleurae pale brown in posterior section. Complete spination of head, thorax and sternites bright yellow to red with black points. Ventral armature of femora bright yellow to orange; ventral surface of metafemora yellow with a green median line. Tegmina brown, becoming more pale towards apex, with a bold longitudinal stripe at anterior margin and several irregular bold white markings. Costal region of alae reddish brown with pale longitudinal veins; usually with a broad, white subcostal stripe which becomes fainter and gradually disappears about $\frac{2}{3}$ the way along the alae or several distinct white markings. Ventral surface of costal region of alae bright pink. Anal region greyish black, slightly transparent and with numerous transparent pale bluish green spots arranged in irregular transverse bands; spots becoming larger and more numerous towards the outer margin. Marginal band more regular and of a darker, more intense green. Anal regions 1-2 with 3-4 $\pm$ distinct, rectangular black markings.

Head: Elongate, 1.5 $\times$ longer than wide, cylindrical, almost parallel-sided. Vertex flat, with 8-13 spines of variable size: 4 prominent central spines forming a quadrate; laterally with 1-3 further prominent spines; occasionally a transverse row of 4 minute spines near posterior margin. Eyes circular and slightly projecting from head capsule. Antennae slightly projecting over posterior margin of mesonotum, with 30 joints. Scapus quadrate, dorsoventrally flattened. Pedicellus slightly longer than broad and shorter than scapus. Third antennomere longer than pedicellus, IV transverse, V-VI of equal length and slightly shorter than III; remaining increasing in length.

Thorax: Pronotum about as long as head, 1.5 $\times$ longer than wide, rectangular with 4-9 rather irregularly placed spines of different sizes. Median transverse depression indistinct, curved and not reaching lateral margins of segment. Prosternum with 2-4 distinct spines. Mesothorax about 2 $\times$ longer than head and pronotum combined. Mesonotum parallel-sided. Metanotum indistinctly longer than wide. Mesothorax, metapleurae and sternum all over set with numerous prominent, long and pointed spines. Tegmina oval and with an indistinct central hump, projecting over posterior margin of metanotum. Alae reaching about half way along tergite III.

Abdomen: Median segment 2 $\times$ longer than metanotum, parallel-sided and about 2 $\times$ longer than wide. Segments II-VI parallel-sided, slightly increasing in length, II almost 2.5 $\times$, VI more than 3 $\times$ longer than wide. VII as long as VI but slightly narrower, 4 $\times$ longer than wide. Tergites II-V with a $\pm$ prominent spine on the posterolateral angle. Sternites II-VII with 4 long, pointed spines arranged in pairs. Praeopercular organ formed by a pair of prominent spines at posterior margin of sternite VII. Tergite VIII about half the length of VII, strongly convex and slightly medially constricted. IX less than half the length of VIII, longer than wide, parallel-sided. Tergite X with a faint median keel, $\frac{1}{2}$ longer than IX, slightly broadening towards apex, posterior margin rounded. Epiproct small, rounded; very slightly projecting over posterior margin of tergite X. Cerci not projecting over tergite X, laterally compressed and tapered towards apex. Subgenital plate keeled, projecting over tergite X by about the length of the two terminal tergites combined; spoon-like and gradually tapered and pointed towards apex (projecting part 10.7-15.0 mm).

Legs: All of moderate length. Antero-dorsal carina of profemora with 6-10 sharp serrations, postero-ventral carina with 9-14 very long and straight, pointed spines. All carinae of protibiae slightly broadened; dorsal carina irregularly wave-like. Probasitarsus slightly longer than following two segments combined, all carinae dilated. Ventral carinae of mesofemora with 6-8 strong teeth, dorsal carinae with a similar number of teeth (more minute on antero-dorsal carina). Ventral carinae of metafemora armed with 9-13 prominent, pointed spines; dorsal carinae with 7-11 more minute teeth. Ventral carinae of mesotibiae with 6-8 quite minute spines, dorsal carina smooth and slightly waved. Ventral carinae of metatibiae with 7-13 slightly backcurving spines, increasing in size towards apex of tibia; dorsal carina smooth and slightly rounded apically. Meso- and metabasitarsus longer than following two tarsomeres combined, ventral carinae with 1-2 minute teeth.

♂: Large (body length 164.0 mm) moderately slender (maximum body width 6.8 mm) and very colourful species with long alae (55.1 mm) and long antennae (74.5 mm). Complete surface of body and legs strongly glabrous.

Colouration: General colour of head, body and legs glabrous bluish green; the latter covered with numerous white spots. Ventral carinae and armature of all femora bright yellow to orange. Complete spination of head, thorax and abdominal sternites bright red with black points. Antennae dark reddish brown; three basal segments bluish green. Head with a bold white longitudinal median and postocular line and two less distinct white infraocular lines. Pronotum with a bold H-shaped, white marking; median line brownish and with a bold longitudinal black marking in anterior half. Mesopleurae with a faint yellow longitudinal line. Tergites II-IX each with an elongate, oval white marking in posterior half of lateral margin. Tegmina brown, becoming more pale and slightly reddish towards apex; with pale veins and a bold white marking on posterior margin, some $\frac{2}{3}$ the way along tegmina. Costal region of alae red (brown at bases) and with two broad longitudinal, white stripes: a subcostal one which becomes fainter and gradually disappears about $\frac{3}{4}$ the way along the alae and a further medial one which is of very irregular width. Anal region generally as in ♀♀ but with more black areas.

Head: Generally as ♀♀, but eyes more prominent and strongly projecting from head capsule. Vertex with a prominent medial pair of spines, behind the eyes with transverse row of four slightly smaller spines. Antennae almost reaching to median segment; generally as of ♀♀ but antennomeres relatively longer.

Thorax: Pronotum as ♀♀; with four prominent spines at anterior margin and a pair of spines just in front of the median transverse depression. Prosternum with a medial pair of average sized spines. Mesothorax $2.3\times$ longer than head and pronotum combined and all over covered with numerous long, pointed spines (paired on mesosternum). Median line of mesonotum slightly raised and clearly visible over complete length of segment. Metanotum indistinctly longer than wide, metapleurae and metasternum densely covered with long pointed spines. Tegmina oval and with a faint central hump; slightly projecting over posterior margin of metanotum. Alae almost reaching posterior margin of tergite IV.

Abdomen: Median segment slightly more than $2\times$ longer than metanotum. Segments II-VI slightly medially constricted and increasing in length, II $3\times$ and VI almost $4\times$ longer than wide. VII as long as VI. Sternites II-V each with a pair of spines at posterior margin (lacking on VI) and another, less distinct pair slightly before middle of segment; VII smooth. Tergite VIII half the length of VII, indistinctly longer than wide and widening towards posterior margin, to almost twice the width of VII. IX $\frac{2}{3}$ the length of VIII and narrowing towards posterior margin. Tergite X as long as VIII, slightly widening towards the posterior, with a slight, concave medial incision and a faint median keel. Cerci cylindrical, tapered towards apex and slightly projecting over posterior margin of tergite X. Vomer triangular, with strongly raised, pale green outer margin; apical teeth minute. Poculum reaching posterior margin of tergite IX, strongly convex, cup-like; strongly keeled in posterior half and with a large, rounded, laterally compressed lamella-like lobe at the angle.

Legs: All comparably long and slender, mid legs reaching posterior margin of tergite IV, hind legs reaching to tergite IX. Antero-dorsal carina of profemora with 8-10 rough serrations, postero-ventral carina with 11 long and straight pointed spines (decreasing in length towards apex of femora). All carinae of protibiae slightly broadened; dorsal carina indistinctly wave-like. Ventral carinae of metafemora with 10-11 prominent, pointed spines, dorsal carinae with a smaller number of more minute teeth. Otherwise armature as ♀♀.

Variation: ♀♀ show considerable variability concerning the size and number of the spines of the body and leg armature as well as the pattern of the costal and anal regions of the alae. The two ♀♀ from Montage des Français deserve special mention, as several characters show slight differences from the HT and further

♀ (examined from a photograph only) from Mourondava. Differences to be observed in the specimens from Montagne des Français are: (1) less numerous spines of the mesothorax; (2) posterior spines of head indistinct or lacking; (3) spine on posterolateral angle of abdominal tergites II-VI more prominent; (4) smaller number of serrations on the postero-ventral carina of the profemora; (5) white longitudinal line on costal region of alae indistinct, bold white markings instead and (6) pattern of anal region of alae less regular, darker towards bases and black markings of anal areas 1-2 more prominent. Furthermore, the pronotum of both specimens lacks the posterior pair of spines and in one even lacks the anterolateral spines, both seen in the HT.

Nymphs: A large ♀ nymph was being photographed by Dr. F. GLAW (ZSMC) at Montagne des Français. It strongly resembles a nymph of *A. punctipes* (AUDINET-SERVILLE), does however already exhibit the typical body spination and is of a paler, yellowish brown general colour with the complete body and legs covered with irregular greyish and whitish markings and speckles. Newly hatched nymphs are dark brown with reddish and greyish speckles, have very short antennae and a body length of about 23 mm.

Egg (measurements in table 11): Large to very large, general colouration, greyish straw to mid brown. Capsule about 1.5× longer than wide, oval in cross-section, complete surface strongly punctured with the intervening regions raised. Anterior margin irregularly toothed. Polar end with a prominent, hollow, crown-like extension which exhibits a transverse slit laterally and two longitudinal holes on the dorsal and ventral surfaces. Dorsal surface of capsule with a prominently raised, irregular longitudinal keel, which includes the micropylar plate; ventral surface with a less distinct median keel. Dorsolaterally a broad, longitudinal keel which is distinctly curved and convex at the micropylar plate. Lateral surfaces with a

Table 10: Measurements (in mm) of *Achrioptera spinosissima* (KIRBY).

	HT, ♀ (BMNH)	♀♀ (ZSMC)	♂ (MNHN)
Body:	238.0	221.8-234.2	164.0
Body (including subgen. pl.):	253.0	232.5-242.5	–
Head:	10.0	12.9-13.2	7.1
Pronotum:	11.0	11.6-12.5	8.1
Mesonotum:	39.0	42.3-48.0	35.7
Metanotum:	14.3	10.9-11.2	7.1
Median segment:	18.7	20.0-22.1	15.2
Tegmina:	20.0	19.8-20.3	14.0
Alae:	54.0	54.0-55.0	55.1
Profemora:	29.0	29.9-32.8	28.2
Mesofemora:	30.0	24.3-27.0	21.7
Metafemora:	42.0	39.8-42.0	34.2
Protibiae:	26.0	28.5-33.0	29.2
Mesotibiae:	25.0	26.2-29.4	21.2
Metatibiae:	36.0	37.1-40.0	31.5
Antennae:	>54.0	>51.0-76.0	74.5

Table 11: Measurements (in mm) of eggs of *Achrioptera* spp.

	<i>A. fallax</i>	<i>A. punctipes</i>	<i>A. punctipes</i> <i>cliquenmoisi</i> ssp. nov.	<i>A. magnifica</i> sp. nov.	<i>A. spinosissima</i>
Overall length:	5.7-5.9	8.8-10.4	9.8-10.8	>6.9	9.2-9.9
Length:	4.6-4.8	6.5-8.1	7.5-7.9	4.6	7.1-7.7
Width:	2.2-2.5	2.5-2.6	2.3-2.6	2.5	2.7-2.9
Height:	2.4-2.9	4.0-4.2	3.9-4.0	3.3	4.8-5.0
Length of MP:	1.9-2.2	1.6-1.8	1.5-1.8	1.8	1.9-2.0

slender, longitudinal and slightly curved carina. All keels run the complete length of the capsule. Micropylar plate small, oval and with both ends slightly pointed. Micropylar cup placed almost in the centre of the plate, cup-like. Operculum oval and with a very prominent, hollow, irregularly shaped, crown-like extension.

Comments: KIRBY (1891: 151) originally described this beautiful species from a single ♀ for which he established the new genus *Enetia*, a synonym of *Achrioptera* COQUEREL, 1861. The HT has since its description suffered from damage and has the terminal four segments of the abdomen badly eaten; the subgenital plate is entirely lacking. REDTENBACHER (1908: 439) described the ♂ from an almost perfect specimen in MNHN.

A live ♂ was examined from a photograph taken by Swiss scientists in the Maintirano region and kindly provided to the authors by N. CLIQUENNOIS (La Réunion). The record is included in the distribution below. Live ♀♀ were examined from beautiful photos taken at Kirindi in the Maintirano region by Mr. M. GRUBENMANN (Switzerland) and Montagne des Français by Dr. F. GLAW (ZSMC). The latter locality is the first record of *A. spinosissima* from Northern Madagascar. Montagne de Français is a dry limestone region just a few kilometres south of Antsiranana (= Diego Suarez) and both ♀♀ were found on a slope close to the coast.

Several eggs were laid by the ♀ collected by Dr. F. GLAW at Montagne des Français in 2003. These were brought to Germany and hatched in January and February 2004. The nymphs immediately started feeding on bramble (*Rubus* spp., Rosaceae) and were, at the point of writing this paper, halfgrown (pers. comm. with Dr. F. GLAW, Mai 2004). Further eggs were laid by the ♀ collected in the same locality in February 2004. Attempts to rear *A. spinosissima* in captivity are still on-going.

Distribution (Map 1): Dry costal regions of Western Madagascar (Bélo sur Tséribihina; Mourondava and Maintirano region) and Northern Madagascar (Montagne des Français).

Genus *Glawiana* gen. nov.

Type-species: *Glawiana glawi* sp. nov., by present designation.

Diagnosis: ♀♀. Small *Achriopterini*. Head indistinctly longer than wide, globose; vertex strongly spherical and bi-lobate. Pronotum and prosternum granulose. Mesothorax slightly longer than 1.5× the combined length of head and pronotum. Surface rugulose and covered with minute granules. Metasternum rugulose. Tergites II-VII at best 1.5× longer than wide; all minutely rugulose and granulose. Tegmina slightly rhombic and with a prominent, convex central hump. Alae slightly projecting over posterior margin of median segment. Sternites II-VII rugulose and with irregular longitudinal carinae. Praeopercular organ formed by a pair of longitudinal posterior carinae. Tergite X strongly tectiform; posterior margin with a broad triangular excavation. Epiproct prominent; triangular and tectiform. Cerci not projecting over posterior margin of tergite X; cylindrical. Subgenital plate keeled, scoop-like and projecting by about the length of tergite X. Postero-ventral carina of profemora armed with single enlarged teeth and a broad, dentate apical lobe. Dorsal carina of all tibiae with ± prominent, rounded lobes. Ventral carinae of meso- and metafemora with a broad basal lobe; dorsal carinae each with a prominent foliaceous lobe some ¾ the way along femora. Ventral surfaces of meso- and metafemora with a longitudinal medial row of minute granules. Ventral carinae of meso- and metatibiae smooth.

♂♂ and eggs unknown.

Differentiation: The new genus differs from *Achrioptera* COQUEREL by: the much smaller, more robust body; globose head, which has the vertex strongly spherical and bi-lobed; relatively shorter scoop-like subgenital plate; not serrate postero-ventral carina of profemora; not serrate or spinose ventral carinae of the mid- and hind legs and presence of prominent, rounded lobes on the dorsal carina of the meso- and metatibiae.

Etymology: The new genus and its type-species are named in honour of its collector Dr. Frank GLAW (ZSMC) who has during the past few years collected several interesting Phasmatodea in Madagascar and kindly gave these to the authors for examination.

Distribution: Southwest Madagascar (presumed endemic).

Species included:

1. *Glawiana glawi* sp. nov.

Glawiana glawi sp. nov.

(Figs. 16, 34-35, 71, 73, 92)

HT, ♀: Südwest Madagaskar, Tuléar, Umgebung Hotel La Mangrove, ausgetrockneter Bachlauf 0-70 m, 23°29'40"S, 43°46'11"E, leg. F. Glaw 2003 (ZSMC).

Description:

The following description is based on the unique ♀ HT. The specimen is complete but was preserved in ethanol which slightly faded the original colours. Thus the colouration is described from several beautiful photos taken of the live HT by its collector Dr. F. GLAW (ZSMC).

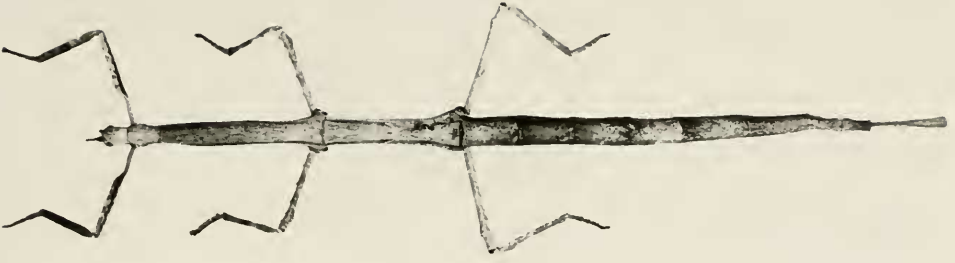
♀: Small (body length 82.0 mm, including operculum 91.8 mm), rather broad *Achriopterini* (maximum body width 5.0 mm), with a rugulose and granulose body surface and alae of moderate length (14.3 mm).

Colouration: General colouration of body and legs a mixture of different shades of grey and brown with innumerable, irregular white markings and transverse black speckles on abdomen. A very prominent white marking in posterior half of mesopleurae and several, distinct transverse white bands on metapleurae. Eyes pale bluish grey (straw in preserved specimen). Head with a fine black postocular line and a conspicuous, truncate black lateroventral marking. Scapus and pedicellus greyish with brown speckles, following antennomers straw. Pronotum with a black longitudinal line at lateral margins, which run about two thirds the way along segment and a black median line which is lacking in the posterior half of segment. Posterior margin with a black medial dot. Tegmina and costal region of alae glabrous grey with rounded white spots; longitudinal veins partly black. Anal region of alae black with numerous transparent patches, which become larger and more numerous towards the base. Cerci mid grey. All femora and tibiae with a bold, brown medial transverse band. All tibiae with a variable black ventrobasal marking on lateral surfaces.

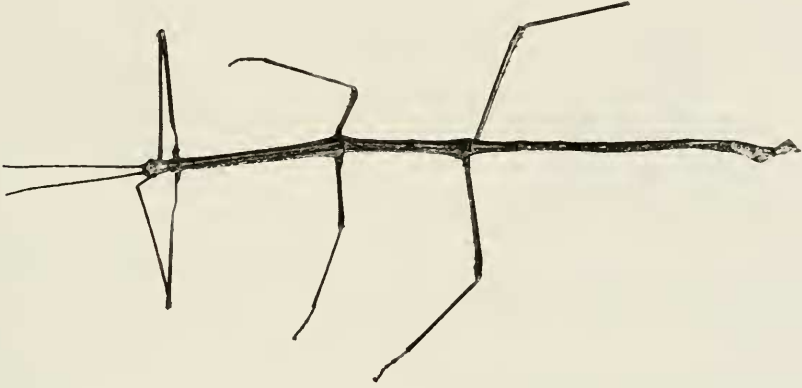
Head: Complete dorsal surface covered with several pointed tubercles of various sizes; three larger ones posteriorly and a pair of spine-like ones between the eyes. Centre of vertex with two prominent, obtuse towards the apices laterally compressed lobes which are themselves covered with numerous pointed tubercles. Antennae with 27 segments, reaching about half way along mesonotum. Scapus trapezoidal, narrowed towards base. Pedicellus transverse. Segment III 2× longer than pedicellus; IV extremely shortened.

Table 12: Measurements (in mm) of *Glawiana glawi* sp. nov.

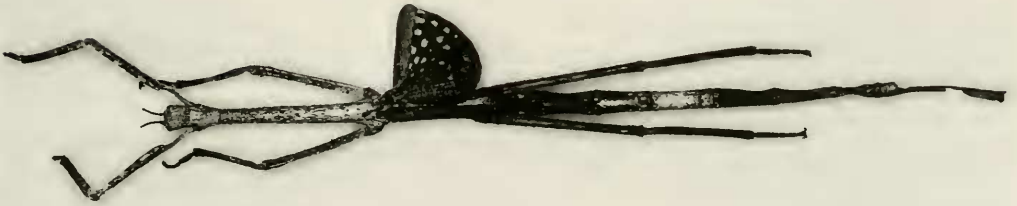
	HT, ♀ (ZSMC)
Body:	82.0
Body (including subgen. pl.):	91.8
Head:	4.6
Pronotum:	5.1
Mesonotum:	16.4
Metanotum:	4.8
Median segment:	8.6
Tegmina:	7.4
Alae:	14.3
Profemora:	17.9
Mesofemora:	13.0
Metafemora:	19.0
Protibiae:	16.1
Mesotibiae:	13.2
Metatibiae:	19.0
Antennae:	19.9



13



14

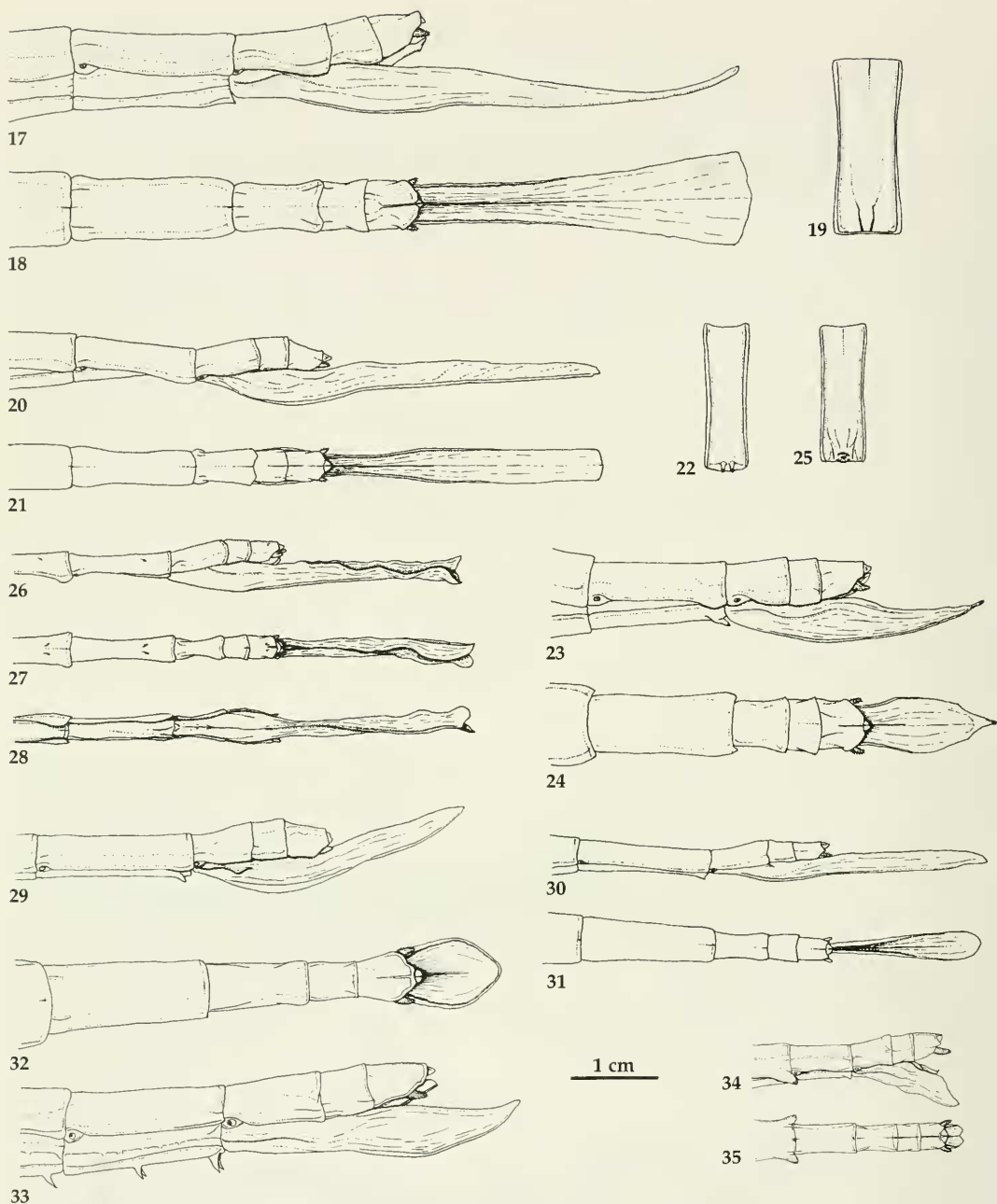


15



16

Figs 13-16. 13, *Achrioptera impennis* REDTENBACHER: ♀, (MNHN). 14, *Achrioptera impennis* REDTENBACHER: ♂ (MNHN). 15, *Achrioptera gracilis* sp. nov.: ♀, HT (MNHN). 16, *Glawiana glawi* gen. nov., sp. nov. ♀, HT (ZSMC).



Figs 17-35. Terminal abdominal segments of ♀♀ of *Achriopterini*.

17-19, *Achrioptera punctipes* (AUDINET-SERVILLE): 17, lateral view; 18, dorsal view; 19, sternite VII, ventral view.

20-22, *Achrioptera magnifica* **sp. nov.** (PT): 20, lateral view; 21, dorsal view; 22, sternite VII, ventral view.

23-25, *Achrioptera fallax* COQUEREL: 23, lateral view; 24, dorsal view; 25, sternite VII, ventral view.

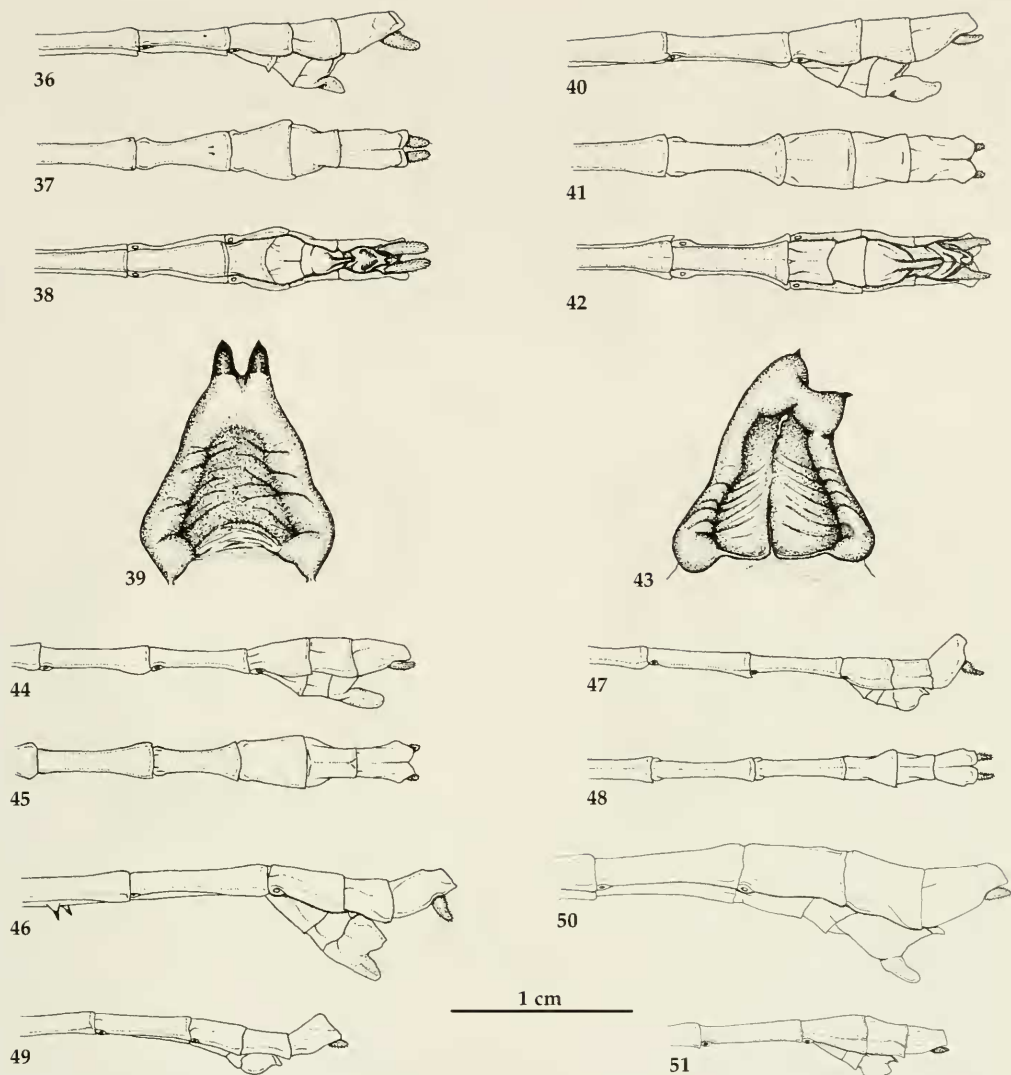
26-28, *Achrioptera gracilis* **sp. nov.** (HT): 26, lateral view; 27, dorsal view; 28, ventral view.

29, *Achrioptera griveaudi* PAULIAN (HT), lateral view.

30-31, *Achrioptera impennis* REDTENBACHER: 30, lateral view; 31, dorsal view.

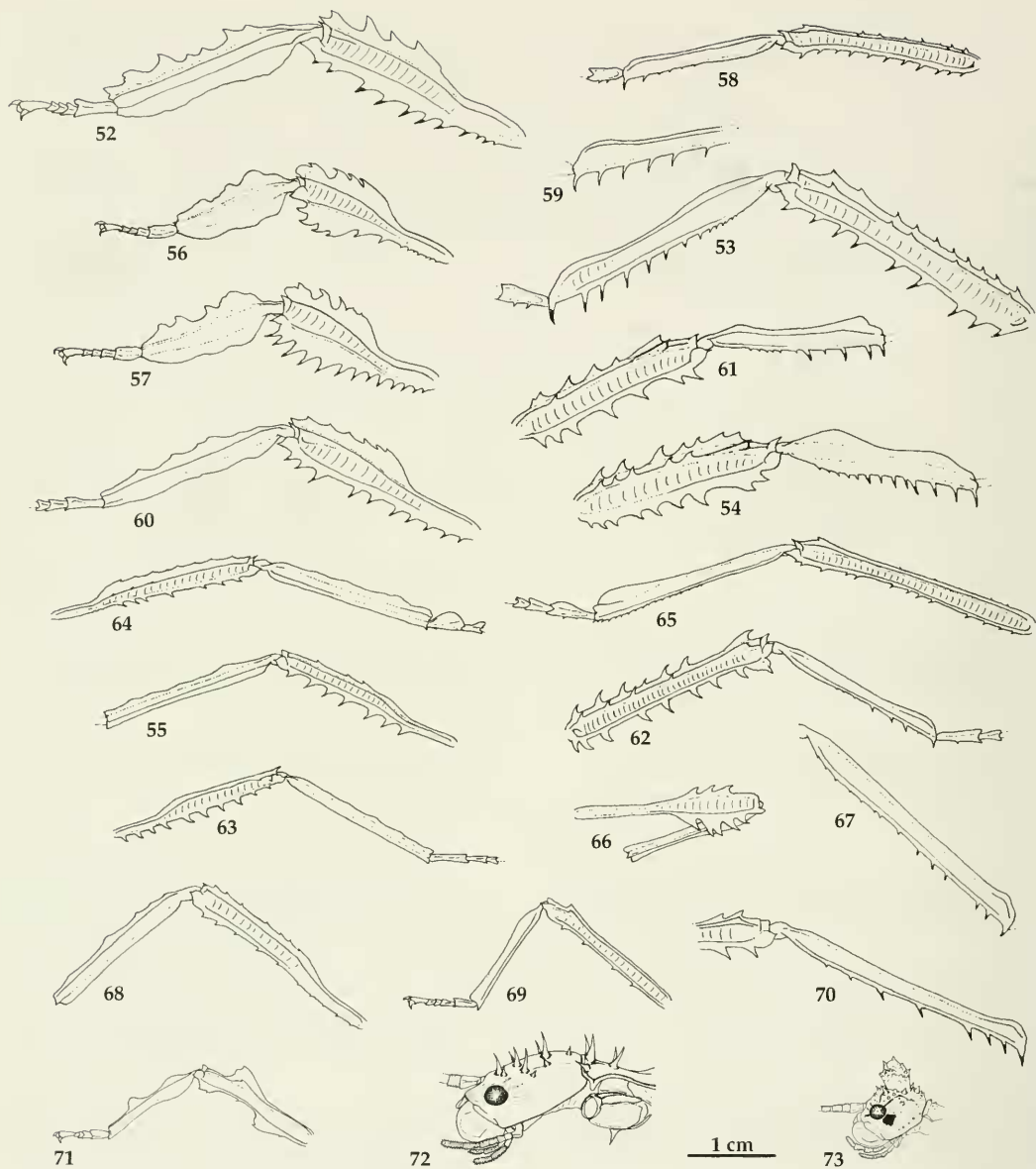
32-33, *Achrioptera spinosissima* (KIRBY): 32, dorsal view; 33, lateral view.

34-35, *Glawiana glawi* **gen. nov., sp. nov.** (HT): 34, lateral view; 35, dorsal view.



Figs 36-51. Terminal abdominal segments of ♂♂ of *Achrioptera* COQUEREL.
 36-39, *Achrioptera fallax* COQUEREL: 36, lateral view; 37, dorsal view; 38, ventral view; 39, vomer (enlarged).
 40-43, *Achrioptera punctipes* (AUDINET-SERVILLE): 40, lateral view; 41, dorsal view; 42, ventral view; 43, vomer (enlarged).
 44-45, *Achrioptera magnifica* sp. nov. (HT): 44, lateral view; 45, dorsal view,
 46, *Achrioptera spinosissima* (KIRBY), lateral view.
 47-48, *Achrioptera pygmaea* REDTENBACHER (LT): 47, lateral view; 48, dorsal view,
 49, *Achrioptera impenis* REDTENBACHER, lateral view.
 50, *Achrioptera punctipes cliquenmoisi* ssp. nov., lateral view (HT).
 51, *Achrioptera lobipes* (REHN), lateral view (HT).

Thorax: Pronotum longer than head, rectangular, slightly less than 1.5× longer than wide. Surface all over covered with minute granules. Mesothorax parallel-sided, 1.6× longer than head and pronotum combined. Complete surfaces of meso- and metathorax strongly rugulose (± longitudinal structures on mesonotum, more irregular and transverse on remaining parts) and additionally covered with rounded granules. Tegmina slightly projecting over posterior margin of metanotum.



Figs 52-73. Legs and heads of *Achriopterini*, lateral views.

52-55, *Achrioptera punctipes* (AUDINET-SERVILLE): 52, ♀ left fore-leg; 53, ♀ right hind-leg; 54, ♀ left mid-leg; 55, ♂ left fore-leg.

56-59, *Achrioptera magnifica* sp. nov. (♀♀, PT): 56, 57, left fore-legs; 58, right hind-leg; 59, apex of right metatibia.

60-63, *Achrioptera fallax* COQUEREL: 60, ♀ left fore-leg; 61, ♀ left mid-leg; 62, ♂ left hind-leg; 63, ♂ left fore-leg.

64-65, *Achrioptera gracilis* sp. nov. (♀, HT): 64, right fore-leg; 65, right hind-leg.

66, *Achrioptera lobipes* (REHN), right fore-leg of ♂, HT [×2].

67-68, *Achrioptera griveaudi* PAULIAN, (♀, HT): 67, left metatibia; 68, left fore-leg.

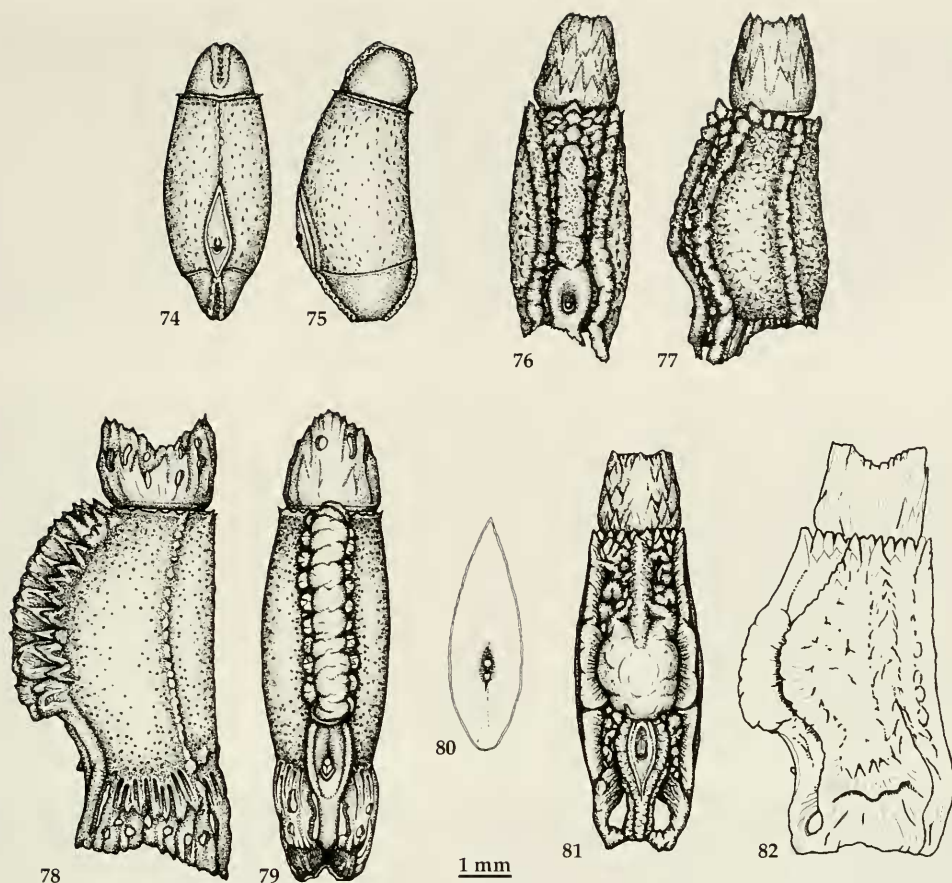
69, *Achrioptera impennis* REDTENBACHER, ♀ right mid-leg.

70, *Achrioptera spinosissima* (KIRBY), ♂ left metatibia.

71, *Glawiana glawi* gen. nov., sp. nov. (♀, HT), right mid-leg.

72, *Achrioptera spinosissima* (KIRBY), ♀, lateral view of head.

73, *Glawiana glawi* gen. nov., sp. nov. (♀, HT), lateral view of head.



Figs 74-82. Eggs of *Achrioptera* COQUEREL.

74-75, *Achrioptera fallax* COQUEREL: 74, dorsal view; 75, lateral view.

76-77, *Achrioptera magnifica* sp. nov. (PT): 76, dorsal view; 77, lateral view.

78-80, *Achrioptera punctipes* (AUDINET-SERVILLE): 78, lateral view; 79, dorsal view; 80, internal micropylar plate (enlarged).

81-82, *Achrioptera spinosissima* (KIRBY): 81, dorsal view; 82, lateral view.

Abdomen: Median segment almost $2\times$ longer than metanotum; structured like meso- and metathorax. Complete surface of abdomen very slightly rugulose and covered with minute granules. Segments II-VII increasing in length; II less than $1.5\times$, VI $2\times$ longer than wide. Tergites II-IV and VII parallel-sided; VI with a posterolateral lobe, VII with posterolateral edges expanded and lateral margins gradually broadened in posterior half of segment. Sternites with a pair of longitudinal carinae at posterior margin. Tergite VIII about $\frac{2}{3}$ the length of VII, $1.5\times$ longer than wide and slightly medially constricted. IX transverse, half as long as VIII. Tergite X as long as VIII. Cerci slightly tapered towards apex. Subgenital plate distinctly downcurving if seen in lateral aspect; lateral margins irregular, apex with a medial notch.

Legs: All relatively broad and of moderate length, mesofemora about $\frac{3}{4}$ the length of mesothorax, hind legs reaching apex of tergite X. Antero-dorsal carina of profemora strongly raised and with 5-6 irregular-lamella-like teeth, postero-ventral carina with two indistinct teeth in basal quarter and a broad, dentate apical lobe. Dorsal carinae of meso- and metafemora with a prominent, rounded lobe some $\frac{3}{4}$ the way along the femora; the one of the postero-dorsal carina about twice the size of the one on anterior carina. Ventral carinae of mesofemora with a large, dentate lobe near the base and 3-4 triangular teeth in apical half which form a dentate lobe at the apex of the femora. Ventral carinae of metafemora with a dentate apical lobe and 2-3 teeth spread over the complete length of the femora; the 2nd enlarged. Dorsal carina of all tibiae with

a prominent rounded lobe close to the base and another similar one close to the apex of each tibia. Ventral carinae slightly rounded towards the basal end; otherwise simple except for a few very minor teeth on the postero-ventral carina of the metatibiae. Basitarsi as long as following three tarsomeres combined, distinctly carinate; dorsal carina of probasitarsus raised and rounded.

Comments: The unique HT was found along a dried up river course, in a dry limestone area close to Tuléar. Due to a reserve of water the vegetation was comparably rich in this locality. Along with the HT, several interesting Reptiles were found, including a gecko which was presumed extinct for several decades (pers. comm. F. GLAW, ZSMC). ♂♂ and eggs unknown.

Discussion

Investigation of phylogenetic relevant criterions such as structures of the genitalia as well as external and internal egg morphology has shown the Phasmatinae BRADLEY & GALIL, 1977 to be a polyphyletic grouping (HENNEMANN & CONLE, in prep.). This has also been suggested by CLARK-SELICK (1998: 226) studying the structure of the internal micropylar plate of the eggs and other authors working on the classification of Phasmatodea (BRADLER, 2001; TILGNER, 2002; WHITING et al. 2003 and ZOMPRO, 2003). But already GÜNTHER (1953: 555) presumed that some of the tribes included in Phasminae (= Phasmatinae BRADLEY & GALIL) did not represent natural (monophyletic) groups and might have to be arranged differently if the ♂♂ tergite X is taken into account. Indeed, the tribe Pharnaciini sensu BRADLEY & GALIL clearly is a polyphyletic group and the so far monotypic Stephanacridini BRADLEY & GALIL is to include several of the genera presently listed in Pharnaciini (HENNEMANN & CONLE, in prep.).

For identifying the close relatives and systematic position of Achriopterini in the classification of Phasmatodea, facts of the biogeography would indicate the closest relatives to be found in the Australian or Neotropical regions (see biogeography). Indeed, extensive research and comparisons have shown some strikingly similar taxa to occur in these zoogeographical regions. *Glawiana* **gen. nov.** exhibits most remarkable similarities to the Papuan genus *Stephanacris* REDTENBACHER, 1908 and certain species of *Achrioptera* COQUEREL, 1861 show striking affinity to the Neotropical genus *Pterinoxylus* AUDINET-SERVILLE, 1838, which is currently placed in Diapheromeridae: Cladomorphinae: Hesperophasmatini.

As our present knowledge of these taxa is still fractional, broader discussion on the position of *Achriopterini* in the classification of Phasmatodea can not be made with assurance. Further studies on this subject will undoubtedly require a revisional study of the so far monotypic tribe Stephanacridini (HENNEMANN & CONLE, in prep.), discovery of the ♂ and egg of *Glawiana* **gen. nov.** and knowledge of certain still unknown sexes and eggs of species belonging to *Achrioptera* COQUEREL. Nevertheless, it seems warranted as a preliminary to summarize the differences and affinities in the morphology of the insects and eggs of Achriopterini BRADLEY & GALIL and (1) *Stephanacridini* BRADLEY & GALIL and (2) the Neotropical genus *Pterinoxylus* AUDINET-SERVILLE below.

1. Tribe Stephanacridini BRADLEY & GALIL, 1977

Extensive studies in the subfamily Phasmatinae have shown Achriopterini to be more closely related to the Papuan tribe Stephanacridini than to any other tribe of Phasmatinae sensu BRADLEY & GALIL. This can, apart from a strikingly similar general appearance of certain species, be observed in several common characters of the insects and eggs:

- 1 no ocelli;
- 2 profemora basally compressed;
- 3 tibiae triangular in cross-section;
- 4 all carinae of protibiae ± elevated and/or lobed;
- 5 body elongate, cylindrical;
- 6 abdomen longer than head and thorax combined;
- 7 mesothorax distinctly longer than head and pronotum combined;
- 8 vomer of ♂♂ clearly visible and sclerotized;
- 9 tergite X of ♂♂ not splitted;
- 10 subgenital plate of ♀♀ elongated, scoop- or spatula-like; and
- 11 internal micropylar plate of eggs closed.



83



84



85



86



87



88



89

Figs 83-89. Right alae and live insects. 83, *Achrioptera magnifica* sp. nov.: ♀, PT (MNHN). 84, *Achrioptera punctipes* (AUDINET-SERVILLE): ♀ (coll. FH). 85, *Achrioptera punctipes* (AUDINET-SERVILLE): ♂ (coll. FH). 86, *Achrioptera fallax* COQUEREL: ♀ (MNHN). 87, *Achrioptera gracilis* sp. nov.: ♀, HT (MNHN). 88, *Achrioptera pygmaea* REDTENBACHER: ♂, LT (NHMW). 89, *Achrioptera punctipes* (AUDINET-SERVILLE) live couple on bramble (*Rubus* sp., Rosaceae).

Stephanacridini however differs from Achriopterini by:

- 1 profemora with a distinct medio-ventral carina (may be spinose);
- 2 cross-section of profemora less distinctly triangular (may be almost trapezoidal);
- 3 meso- and metafemora with a spinose and distinct medio-ventral carina;
- 4 gonapophyses of ♀♀ elongated, filiform and projecting distinctly over the apex of tergite X;
- 5 vomer of ♂♂ with a single point;
- 6 praeopercular organ of ♀♀ extinct or indistinct;
- 7 dorsal carinae of meso- and metatibiae extremely neared or at best partly, but never completely fused with another;
- 8 eggs globose or slightly lense-shaped; glabrous;
- 9 polar-area of the eggs simple, without extensions; and
- 10 operculum of the eggs with a central capitulum; no peripheral extension on outer margin.

The globose and spinose head and general appearance of *Glawiana* **gen. nov.** show remarkable similarity with the type-species of *Stephanacris* REDTENBACHER, namely *St. brevipes* REDTENBACHER, 1908. Furthermore, the relatively short legs of ♀♀, shape and position of the leg armature and presence of either rudimentary or fully developed alae show striking convergences.

2. Genus *Pterinoxylus* AUDINET-SERVILLE, 1838

Comparison of Achriopterini with the Neotropical *Pterinoxylus* AUDINET-SERVILLE, 1838 (Type-species: *Pterinoxylus difformipes* AUDINET-SERVILLE, 1838) do as well show striking similarities, not only in general appearance but also in the structures of the genitalia and extrimities. The eggs are remarkably similar and exhibit similar, peripheral polar and opercular extensions as in *Achrioptera* COQUEREL. They do however clearly differ by having an open internal micropylar plate with a median line. BRADLEY & GALIL (1977: 188) and subsequent authors placed *Pterinoxylus* AUDINET-SERVILLE in Diapheromeridae: Cladomorphinae: Hesperophasmatini.

Convergences, represented by common features of Achriopterini and *Pterinoxylus* AUDINET-SERVILLE are:

- 1 cross-section of profemora triangular;
- 2 cross-section of meso- and metafemora trapezoidal;
- 3 body elongate, cylindrical;
- 4 abdomen longer than head and thorax combined;
- 5 mesothorax distinctly longer than combined length of head and pronotum;
- 6 subgenital plate of ♀♀ elongated, tube- or spatula-like;
- 7 vomer of ♂♂ clearly visible and sclerotized;
- 8 tergite X of ♂♂ not splitted;
- 9 ♀♀ with a distinct praeopercular organ;
- 10 meso- and metafemora without a medio-ventral carina;
- 11 carinae of the protibiae of ♀♀ strongly elevated, ± lobed; and
- 12 eggs elongate, with prominent hollow peripheral extensions on operculum and polar-area.

Characters which however clearly distinguish *Pterinoxylus* AUDINET-SERVILLE from Achriopterini are:

- 1 profemora with a medio-ventral carina (although indistinct);
- 2 tergite VII of ♀♀ laterally dilated;
- 3 vomer of ♂♂ with a single point;
- 4 meso- and metatibiae trapezoidal in cross-section; dorsal carinae not fused with another; and
- 5 internal micropylar plate of eggs open and with a short median line.

Apart from morphological affinities also similarities in the behaviour and biology of the live insects can be observed. LELONG, LANGLOIS, RASTEL & DOREL (2003: 75) report two of the three described species of *Pterinoxylus* AUDINET-SERVILLE, to exhibit a very typical rest position with the mesotibiae being folded against the femora, without a recline. The same typical rest position has also been reported and illustrated for nymphs of *Achrioptera punctipes* AUDINET-SERVILLE by HENNEMANN (1994: 10-11, figs. 5-7) and has been observed in nymphs of *A. spinosissima* (KIRBY, 1891) as well (personal communication with Dr. F. GLAW, ZSMC). In addition, adults of both genera exhibit the same spectacular active defensive behaviour, which includes spreading the wings, curling up the abdomen, producing a rustling noise by rubbing the tegmina and alae to another and pinch with their spiny hind legs.



Figs 90-92. Live insects. 90, *Achrioptera punctipes cliquennoisi* ssp. nov.: ♂, HT at type locality (photo by N. CLIQUENNOIS). 91, *Achrioptera spinosissima* (KIRBY): ♀ from Maintirano Region (photo by M. GRUBENMANN). 92, *Glauviana glawi* gen. nov., sp. nov. ♀, HT at type locality (photo by F. GLAW)

The tribe Achriopterini is an evolutionary rather old and unspecialized group of Phasmatoidea, which can be seen in numerous features, e.g.: the large size and striking habitus; striking sexual dimorphism; long abdomen which is longer than the head and complete thorax combined; presence of tegmina and more or less well developed alae (rudimentary in more specialized forms) and simple antennae.

The new genus *Glawiana* **gen. nov.** is only known from the ♀ and *Achrioptera* COQUEREL is as yet only fractionally known. Four of the nine described species of *Achrioptera* COQUEREL are only known from a single sex and eggs are only known from four species. Thus, the exact intrageneric position of the different taxa and phylogeny of the genus will as yet remain unclear in most parts. The knowledge of the still unknown sexes and eggs would be urgently required if any broader discussion on this subject is to be done with assurance.

Briefly however it seems warranted to mention that the nine species of *Achrioptera* COQUEREL would upon features of the insects generally fall in two categories: (1) those with a very cylindrical and flat head, having at least the meso- and metathorax and legs distinctly spinose and ♂♂ having a distinct lobe on the poculum (mostly very colourful insects); and (2) those with a slightly rounded vertex, having the thorax and legs less distinctly spinose and ♂♂ having the lobe of the poculum distinctly reduced (usually of a greyish or brownish general colouration). The type-species *A. fallax* COQUEREL, *A. griveaudi* PAULIAN, *A. lobipes* (REHN), *A. magnifica* **spec. nov.**, *A. punctipes* (AUDINET-SERVILLE) and *A. spinosissima* (KIRBY) fall in the first category. The second category includes *A. pygmaea* REDTENBACHER, *A. gracilis* **spec. nov.** and perhaps *A. impenis* REDTENBACHER which however has a quite isolated position in the genus.

Presumed sister-taxa relations may be *A. punctipes* + *A. magnifica* **spec. nov.** and *A. fallax* + *A. spinosissima*. In addition, *A. pygmaea* REDTENBACHER (only ♂♂ known) and *A. gracilis* **sp. nov.** (only ♀♀ known) appear to be very closely related., but without knowledge of the unknown corresponding sexes a decision about a possible sister-taxa relation cannot be assured.

So far, *Glawiana* **gen. nov.** is only known from a single ♀ and several species of *Achrioptera* COQUEREL are only known from one sex. Followingly, and due to the general poor degree of exploration of the Madagascan phasmid fauna, the discovery of further, still undescribed taxa of Achriopterini remains very likely.

Biogeography

Madagascar is the world's fourth largest island, positioned some 300 kilometres off the African east coast. According to the high diversity of vegetation and its geology, Madagascar exhibits a large range of different habitats, which results in a high biodiversity and a high degree of endemisms. The fauna and flora exhibits closer affinity with the Austro-Malayan, Papuan and Polynesian faunas than to that of the African continent and does additionally show considerable affinity to the Neotropical fauna.

The presence of certain groups of animals and plants in Madagascar can either be of definitely old origin and traced back to an early settlement before the island's separation from the African continent, or may represent the results of later settlements from Africa via the Mozambique Channel during various times. As presently presumed, Madagascar has separated from the African continent since the middle Jurassic and has attained its present location in the early Cretaceous (COX & MOORE, 1993). During the late Jurassic it acted as a land connecting to India, Antarctica and Australia. Since the middle Jurassic when Madagascar separated from the African continent, Antarctica has represented a land connecting to South America. Since the separation of Antarctica and Australia, Madagascar furthermore, acted as a land connecting to India until the late Cretaceous (BRIGGS, 1987).

In numerous features the tribe Achriopterini is seen to be an evolutionary rather basal and unspecialized group of Phasmatoidea (see discussion). Thus, and since there are no records of taxa belonging to or into closer relation of Achriopterini from the African continent, a late settlement via Africa can be shut out. The Comoros inherit only one known species, but are of a late volcanic origin. Consequently, a settlement of these islands must be regarded to have taken place via Madagascar and not Africa. As all taxa are endemic in Madagascar and the Comoros a much earlier settlement, perhaps during the middle or late Jurassic, via India, Australia or even Antarctica is much more likely. This would confirm an evolutionary quite basal position of Achriopterini and furthermore indicates relation to taxa of the Papuan or Neotropical regions.

Indeed, extensive comparison have shown the most closely related taxa to be found in the Papuan and Polynesian subregions of the Australian region and the Neotropical region. As discussed above, numerous

morphological features of the insects and eggs as well as a strikingly similar general appearance of the insects indicate close relations to the Papuan tribe Stephanacridini BRADLEY & GALIL, 1977, presently also a member of Phasmatinae sensu BRADLEY & GALIL, 1977. Furthermore, relations to the Neotropical genus *Pterinoxylus* AUDINET-SERVILLE, 1838 can be observed which is currently placed in Diapheromeridae: Cladomorphae: Hesperophasmatini (see discussion).

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Finally, the authors would like to express their thanks to M. BRÜCKNER (ZSMC) and Mrs. A. MOSTYN (Freinsheim, Germany) for reading the manuscript and providing helpful comments.

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